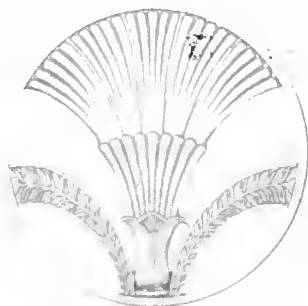


HOW TO CHOOSE A FARM

HUNT



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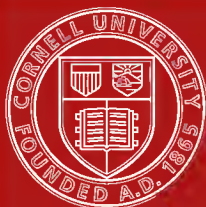
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HOW TO CHOOSE A FARM



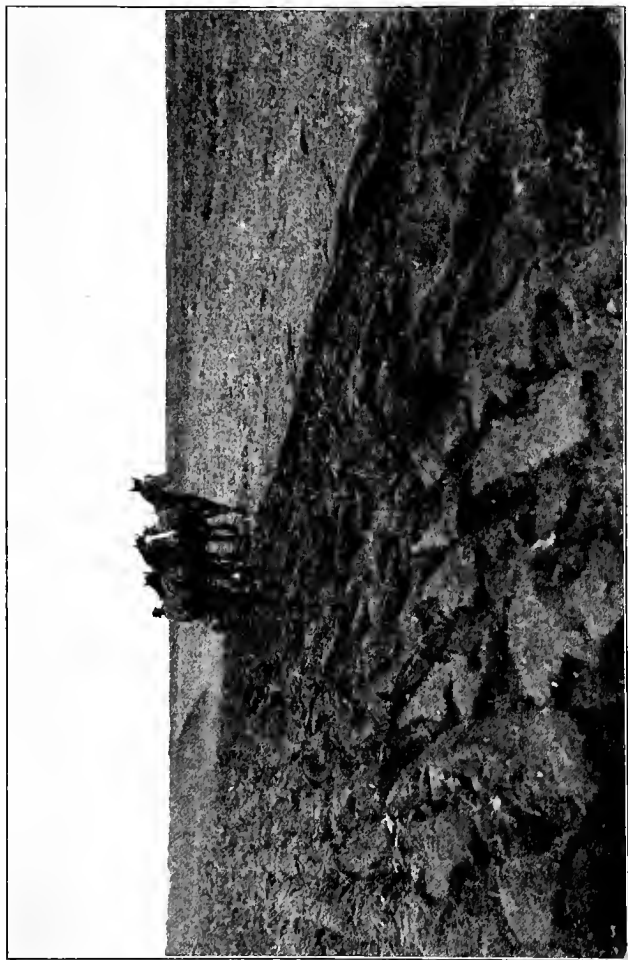


FIG. 1. The Conquest of American Lands.

HOW TO CHOOSE A FARM

WITH A
DISCUSSION OF AMERICAN LANDS

BY
THOMAS F. HUNT

PROFESSOR OF AGRONOMY IN CORNELL UNIVERSITY
AUTHOR OF "THE CEREALS IN AMERICA"

For successful farming, three conditions are necessary,—knowledge, capital and fondness for the pursuit.—*Columella*.



New York

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PREFACE

IF the people of America should stop acquiring land, in one generation no land would be owned therein. Probably all the land changes hands by purchase, gift or inheritance, on an average, at least three times in a century. Since comparatively little farm land is held by corporations, this change of ownership involves usually a distinct change in management. There is, perhaps, on this account less continuity of effort in farm enterprises than in other industries. The laws of inheritance, combined with other factors, tend rather to bring the land into the general market than to maintain it within the family circle. The result is that land is constantly coming on the market in old and well-settled regions as well as in the newer and less developed parts of the country.

In this book the attempt has been made to state the principles concerned in the selection of a farm, and then to apply these principles to a discussion of the different regions of the Western Continent. It has been recognized that a farm has a value as a home and a value for business purposes. Since the home value must be so largely dependent on the personal ideas of the dweller therein, it has been sought to dissociate the home value

from the discussion as far as possible and confine it chiefly to the economic value of the farm. The book, therefore, naturally falls into two parts. The first eleven chapters treat of the selection of a farm for profit, with some illustrations of the principles involved. A score-card for judging farms, such as used by the author for a number of years in teaching this phase of farm management to college students, has been made the basis of the discussion in the hope that it may prove a means of concreting the ideas of the reader. The last eight chapters of the book deal with the thirty different regions into which the author has divided America for the purposes of treatment. The discussion of each region follows the order of the score-card outlined in the earlier chapters in order that logical comparison of the different regions may be made.

The division into regions has been by states and countries, although it is well known that differences of soil and climate and in kinds and methods of farming do not follow state lines. Statistical data, however, are available only by these political divisions, and, moreover, the familiarity of the reader with such divisions makes it easier to grasp the discussion. In using statistics, care has been taken to employ only those from authoritative sources. Those for the United States are, when not otherwise stated, from the Twelfth Census.

The manuscript of nearly every one of the thirty

regions has been read and criticized by some one at present living or who has lived therein, and in many instances by two or more persons. Many changes have been made and much new material has been added by persons who know intimately the local conditions. By this means the authenticity of this portion of the book has been greatly increased and its value thereby proportionately enhanced. The author is indebted to the following persons, either for such criticisms or for illustrative material, or for both:

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DUGGAR, J. F.	MILLER, M. F.	

In this connection, the author's secretary, C. C. Poindexter, deserves special mention.

No doubt many persons will feel that full justice has not been done to the particular region in which they live or are especially interested. If the description of the regions seems to some to lack enthusiasm, the author can only plead that his purpose has been to write without prejudice, exaggeration, or misstatement of fact.

THOMAS F. HUNT.

CORNELL UNIVERSITY,
Ithaca, N. Y., June 1, 1906.

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HOW TO CHOOSE A FARM

CHAPTER I

SEEKING AN INVESTMENT

A PUBLIC speaker of the writer's acquaintance was in the habit, when possible, of taking a walk in the field and forest before making an address. He had certain little whims in which he indulged. Who does not have his idiosyncrasies,—or shall we say individualities? One of these was the collection of walking-sticks that he cut while on his rambles.

Following his usual bent, he stepped from the open field into the forest, and just as he entered he noticed an especially fine sprout that had many of the desired qualities of a good cane. His critical eye, however, observed slight imperfections. He passed on. Thus he examined, during an hour's walk, every young sapling or branch that gave promise of being suitable. Every one was rejected for one reason or another, until, just as he was leaving the forest, he cut the one that suited his fancy better than any other he had seen during his long walk. It was the first sprout which he had examined on entering the forest.

It is a sound business principle that investment should be made in enterprises that are under the eye. Distance lends enchantment. In business one needs to

be disenchanted. An investment in one's own state is to be preferred to one in a distant state. One has a better knowledge of the laws affecting the business in one's own state and one is more likely to have a sound judgment of economic conditions. An investment in one's own community is to be preferred to one in an adjacent community. Others interested in the same or similar investments are neighbors, giving better opportunity to judge of the character and of the stability of the enterprise. If this principle were followed more closely, get-rich-quick concerns would not flourish.

If a man can not see any profit in farming in his own neighborhood, it may be that such inability would stand in his way of success in regions where he had less acquaintance with conditions. Every place has its defects; no place has all the advantages. All the advantages of a given farm, if generally known, must be paid for. While every place has its advantages and disadvantages, the sum of the advantages of one place may be in excess of that of another. The lack of adaptation of the farm management to the natural and economic conditions is a common source of failure. The agriculture of the United States has reached that phase in which hereafter its development is to be internal. The future development is to consist largely in a more marked crop adaptation and a greater segregation of farm industries as a result of such adaptation of crops to natural and economic conditions. Places found well adapted to apples or peaches will become greater centers of apple- or peach-growing; those adapted to grass, greater centers of the industries

based on grass. More careful systems of crop diversification will be adopted.

The problem of crop adaptation has been studied consciously and unconsciously ever since the country was first settled. In its very nature, it can never be wholly settled and can never remain settled; but while the agriculture of the country was expanding territorially, crop adaptation and specialization did not assume the importance that they will in the future, since the pioneer occupation of the land has been measurably completed or is, at least, relatively much less rapid. Persons whose tastes and training fit them for certain lines of farming will seek those regions best adapted to the character of farming which they wish to follow, rather than attempt to develop such industries in the regions where conditions are not favorable.

PERSONAL CONSIDERATIONS

Personal considerations enter into the selection of a farm.

1. *The man's experience.*—A man experienced in horse-raising may buy a farm of comparatively cheap land on which to raise horses. The kind of horses might affect the kind of farm. Undoubtedly draft horses can be raised most successfully on level land, while light horses may be raised on rolling land. The contour of the land has had much to do in developing distinct breeds of live stock in England. Generally speaking, stock-raising of all kinds may be practical on the rougher and cheaper lands. If one wishes to run a

dairy-farm, other things equal, he should choose a cool climate; while, if he wishes to raise cotton or sugarcane, he must choose a warm climate, and if he wishes to raise rice, he must seek not only a warm climate, but land that is capable of being irrigated. If he wishes to raise live stock of any kind, he should see to it that his land will support good pastures.

2. *Adaptability of the person.*—Certain men are adapted to certain kinds of work and not to others. Certain men who can make a profitable living at market-gardening in what seems to others a sand-bank would fail utterly as ranchmen. In every locality there are certain men who are noted for raising large crops of maize or wheat, or for the production of live stock of particular kinds. These things affect the purchase of land. Taylor has shown that farmers with ability to secure the largest profit per acre can out-compete farmers of less ability in the use of the most productive land, as well as in the use of the highest class of machinery and live stock and of the best farm methods. On the other hand, while farmers of less ability can not make a profit on the most productive land or with the best methods, on account of the higher cost, yet they may do so on land of less value and with cheaper methods. Thus the tendency of the most intelligent and thrifty farmers to occupy the best farm lands, while the less efficient occupy lands of cheaper grade is shown to follow an economic principle. The causes for the distribution of farmers are so complex, however, that there must necessarily be many exceptions to the law.

3. *The amount of capital to invest.*—Not only the amount of land, but its location, is affected by the amount of capital to be invested. A young man who has his spurs yet to win and only a thousand dollars in capital may advisedly buy 160 acres of land in a pioneer country where land is likely to rise in value; while an older man with ten thousand dollars may properly buy the same sized farm in a settled community near local markets. As a rule, it is not a good practice to put all one's capital into the land. The higher the price of the land, the less the proportion of the capital that should be put into it. Where land is cheap and the rise in value certain, a man may put all his capital into his land and then go in debt for more land, and for his teams, tools and seeds, knowing that the rise in value of the farm will soon put him out of debt.

THE FARM AS A HOME

The value of a farm is to be considered from two aspects, namely, its agricultural or economic value, and its home value. This latter aspect must be considered, whether the purchaser intends to live on it or whether he intends to rent it. Among the things to be considered in selecting a farm as a home are healthfulness, sightliness, nearness to schools, churches and neighbors, as well as the ease of communication and travel; the intellectual, social, moral and religious character of neighbors will affect the choice of a home, whether in the country or in the city. If the purchaser expects to live upon the farm, its home value

will be of prime importance. Stated in terms of money, it will be as important as the purchaser feels able to make it. It is the tendency of man to live as well as he can afford to live. In general, the farmer is no exception to this rule. Most farmers are contented with a relatively or seemingly small income for capital invested, because their business and homes are one. To put it in other words, the farms of the United States are capitalized above their commercial value because they serve as a home as well as a business.

The rental value of the homes occupied by the farmers of the United States has been estimated at a little less than a hundred and fifty million dollars.¹ This is based on the estimate that the total value of farm homes is less than one and a half billion dollars, and this in turn is based on the reports of the Ohio State Boards of Equalization for 1880 and 1890, which estimate the aggregate value of all buildings on farms at about 14 per cent of the aggregate value of the farms. The census estimate of the value of all farm buildings in 1900 was \$3,560,000,000. In fact, however, a farmer pays not only for the value of the building in which he lives, but he pays an increased value per acre for his farm as a "lot" on which to build his home. How much a man should pay for a farm as a home is a personal and sociologic question, rather than an economic one; and, while it is recognized to be of prime importance, the value of a farm as a home is scarcely within the scope of this work.

¹ Spahr: "The Present Distribution of Wealth in the United States," p. 97.

In the pages that follow it is proposed to discuss those factors which enter into the selection of a farm from the standpoint of an investment, in so far as the economic aspects can be dissociated from the sociologic. That they cannot be entirely dissociated is obvious. It may, perhaps, be better to say that in what follows, emphasis is to be placed on the economic value of the farm. The following outline arranged in the form of a student's score card shows the main points to be considered:

ECONOMIC VALUE OF FARM		Standard	Student's score
1. <i>Kind of Farming</i> —			
Adaptation as affecting value	}	. . .	3
Proportion			
2. <i>Size</i> —			
As adapted to kind of farming to be pursued			2
3. <i>Shape</i> —			
As affecting shape of fields			2
As affecting nearness to farmstead			3
4. <i>Topography</i> —			
As affecting production			1
As affecting ease of cultivation			3
As affecting loss of soil fertility			2
5. <i>Fertility</i> —			
Natural			15
Condition			5
6. <i>Physical Properties</i> —			
As affecting economy of cultivation . . .			1
As affecting number of days of labor . .			1
As affecting loss of soil fertility . . .			2
7. <i>Drainage</i> —			
Natural	}	. . .	5
Artificial, according to its needs . . }			

		Standard	Student's score
8. <i>Condition</i> —			
	Freedom from stumps, stones, weeds, waste land, etc.	3	
9. <i>Climate</i> —			
	As affecting production and cost of raising live stock	3	
	As affecting number of days of labor . . .	2	
10. <i>Healthfulness</i> —			
	As an economic factor	5	
11. <i>Water-supply</i> —			
	Running water	} . .	5
	Wells		
12. <i>Location</i> —			
	Local markets for purchase and sale . .	5	
	Neighbors as an economic factor	5	
	Shipping facilities	5	
	Roadways	5	
13. <i>Improvements</i> —			
	Location of farmstead	3	
	House as adapted to needs of farm . . .	5	
	Other buildings as adapted to size of farm and kind of farming	5	
	Fences, character, condition and arrange- ment	2	
14. <i>Timber, Orchards, Vineyards, etc.</i>		2	

CHAPTER II

ADAPTATION AND SIZE OF FARM

THE KIND OF FARMING AS AFFECTING VALUE OF FARM

IN the distinctly maize-growing states, what is known as good corn land is worth about one hundred dollars per acre at the present time. It is worth this, because, if the land be judiciously managed, it will bring a fair return for the money invested. Land eminently suited to the growth of celery in certain states, as Michigan and Ohio, is considered a good investment at much greater value. Wheat land which is not also distinctively good maize land does not bring so much money as good maize land. It is true that the average gross income from a crop of wheat is little more than from maize during the past decade in the United States.

A number of factors enter into the problem to make maize land worth more than wheat land. Good maize land may raise four crops of maize in a rotation of six years; while in the same time wheat usually can not appear more than twice. It is often excellent wheat land, as on the Western Reserve in Ohio, without being good maize land: yet, maize must be raised as a cultivated crop in rotation, although it brings a poor return. On maize land where wheat does not succeed, oats usually do well. The total income from a crop of wheat is what the crop can be sold for on

the market. The maize crop, however, offers an opportunity to make a profit from the manufacture of maize into animal products, and along with the manufacture of maize the opportunity to manufacture the cheaper products of the farm into animal products and into fertilizers. On a hill farm of 200 acres in Delaware county, New York, shown on the page opposite, the gross sales annually are \$10,000, although the only soil products are grass, pasture and meadow, with a small acreage of oats. These, together with purchased feeds, are turned into butter and eggs. Everything is condensed before being sold; thus the farm is constantly improving in its crop-producing power through the return of the fertilizers, not only from the crops raised, but from the food purchased. Nothing is allowed to go to waste. Even the woodchucks are trapped, boiled and fed to the chickens.

The differences in the value of land are still more fundamental. The cultivation of wheat is almost worldwide, while, at present, less than ten states of the United States enjoy a commercial monopoly in producing maize for the markets of the world. Land that is suited only to sheep husbandry, or is principally adapted to that industry, is perhaps the least valuable of any considerable area of productive land, unless it be that suited to forest growth only. The returns that can be obtained from land pastured by sheep are at present considerably less per acre than those to be obtained from land under cultivation. Back of this lies the fact that there are in the world large areas valuable for the production of sheep that have not become of economic



FIG. 2 A grass, dairy and poultry farm among hills of eastern New York Gross receipts of this 200-acre farm, \$10,000 per year.

value for the growth of cultivated crops. The value of this land, therefore, has been correspondingly low. For example, probably more than half of the sheep of the United States are raised on government land.

It is obvious, therefore, that the agricultural value of the farm will depend on the adaptation of the farm to kinds of farming. The author knows of a locality entirely removed from any large city where the annual rental of some of its land is two or three times as much as other acres will sell for in the immediate neighborhood. The first is adapted to fruit-raising, while the other is adapted to grazing or forestry. There is great variation in the adaptation of different parts of the same farm. The price per acre of two farms may vary greatly; while, if the amount of arable land in each is considered, the values may be far less striking. One of the reasons for the relatively high price of farm lands in the North Central states is the fact that a comparatively large proportion of the area of each farm is arable. In estimating the value of any given farm, therefore, the proportion of land adapted to several kinds of farming must be carefully considered.

SIZE OF FARM

According to the census of 1900, the average size of the 5,739,657 farms of the United States was 147 acres, of which about 72 acres were improved land. The average size of the farms of the North Atlantic states was 97 acres, of the Western states 386 acres.

The average farm area in the other three geographic divisions lies between these figures, as follows: South Atlantic, 108 acres; North Central states, 145 acres; South Central states, 155 acres. The average area of improved land per farm shows less variation and in a somewhat different order. The South Atlantic and South Central states each have 48 acres; North Atlantic, 57 acres; North Central, 101 acres; while the Western states have 112 acres of improved land per farm. If the farms of the United States be divided into the following four groups: (1) Under 50 acres, (2) 50 and under 100, (3) 100 and under 500, (4) 500 acres and over, it will be found that the largest number of farms in any one group is in that between 100 and 500 acres, as shown in the following table, taken from the census for 1900:

FARMS CLASSIFIED BY AREAS

Area of farm, acres	Number of farms	Total area in farms, acres	Area of improved land, acres
Under fifty	1,933,243	48,735,001	39,454,708
Fifty and under 100 . .	1,366,167	98,600,285	67,348,377
100 and under 500 . . .	1,990,424	415,663,866	253,928,251
500 and over	149,823	268,102,394	44,061,855

The size of the farm selected should be adapted to the kind of farming which is to be pursued thereon. It should be large enough so that the gross income will afford possibility of a competence. The average gross income per acre from the products of the farms of the United States, according to the census of 1890, was a little less than four dollars; while the average value per acre of the produce from truck-farms was

about \$140 per acre. To obtain a gross income of \$4,000 per annum from the average truck-farm, it would require, therefore, less than thirty acres; but to receive the same gross income from the average farm, it would require more than one thousand acres. In many sections of the United States there is land that can be bought for five dollars per acre. While forty acres of such land might produce a good return for the money invested, the total return would not be sufficient to make it a wise investment. If 2,000 acres of such land could be purchased in one tract, it might bring the same return as \$10,000 invested in 200 acres devoted to cereals.

In determining whether the size of the farm is sufficient to bring in a gross income, say of \$4,000, it will be necessary to estimate the productivity of the soil on which the crops are to be raised, as compared with the average production given in the tables; and to determine whether the location indicates the probability of a greater or less price than the average. The United States Department of Agriculture publishes annually estimates of the average yield and average December price of the staple crops for each state in the United States. These estimates are available to all citizens and should be consulted by those expecting to purchase farms. It also should be borne in mind that by judiciously turning the soil products into animal products, the gross income may be increased. Below are three tables giving by five-year periods the average yield per acre, the average farm price on December first,

and the gross income of the principal farm crops of the United States, according to the estimates of the United States Department of Agriculture:

AVERAGE YIELD PER ACRE OF FIVE CROPS

	Maize Bu.	Wheat Bu.	Oats Bu.	Potatoes Bu.	Hay Ton
1866-9	24.6	11.8	28.3	96.4	1.29
1870-4	26.5	12.2	27.7	86.7	1.16
1875-9	27.7	12.5	29.1	89.2	1.28
1880-4	23.9	12.3	26.5	80.0	1.23
1885-9	24.4	11.8	27.4	73.0	1.17
1890-4	22.5	12.9	24.2	69.2	1.21
1895-9	25.7	13.4	28.2	84.0	1.35
1900-4	24.2	13.3	30.1	87.5	1.42

AVERAGE PRICE PER UNIT OF FIVE CROPS

	Cents	Cents	Cents	Cents	Dollars
1866-9	52.8	120.7	39.8	53.9	10.15
1870-4	46.1	102.7	37.4	59.8	12.84
1875-9	34.9	96.0	32.1	48.5	8.89
1880-4	46.0	91.6	36.2	55.3	10.23
1885-9	35.2	75.3	28.0	48.1	8.63
1890-4	42.6	66.6	35.5	58.1	8.37
1895-9	26.4	64.2	22.0	38.0	6.96
1900-4	44.6	70.0	32.4	54.7	9.15

GROSS INCOME PER ACRE FROM FIVE CROPS

	Dollars	Dollars	Dollars	Dollars	Dollars
1866-9	12.99	14.24	11.26	51.96	13.09
1870-4	12.22	12.53	10.36	51.85	14.89
1875-9	9.67	12.00	9.34	43.26	11.38
1880-4	10.99	11.27	9.59	44.24	12.58
1885-9	8.59	8.89	7.67	35.11	10.10
1890-4	9.59	9.59	8.59	40.21	10.13
1895-9	6.78	8.60	6.20	32.00	9.40
1900-4	10.79	9.30	9.75	47.86	13.99

During the five years, 1895-9 inclusive, the gross income from an acre of maize has been less than in any like period in at least thirty-five years; but it does not follow that the farmers made less money, because a large part of the maize was turned into animal products which sold since, and including 1897, at relatively high prices. During the five years ending 1904, the price of maize has been high, and the price of animal products relatively low.

Where land is cheap, farms should be large for two reasons; first, the products are usually cheaper and more is necessary to give a profit; second, there is more profit to be expected from the rise in value of farm land. In England it is considered that where lands are in permanent grass and the dairy the main source of profit, farms may be smaller than where they are devoted to tillage crops. In America, however, farms devoted largely to grazing and the rearing of live stock are relatively large, as shown by table on page 21.

The question of the most suitable size of a farm has been the subject of much discussion. To the popular mind it would appear that all farms are too large.

"A little farm well tilled,
A little barn well filled,
A little wife well willed"

contains a pretty sentiment to which men are apt to give hearty assent, but it may be doubted whether it contains sound economic truth. No statement, per-

haps, receives more credence than that if the farmer would till less acres and till them better, his net profit would be greater. This may be admitted without in any way affecting the view with regard to the size of the farm. It is equivalent to saying that the farmer does not manage his farms to the best advantage, either from a lack of capital or from a lack of ability. The author, however, does not make any such assertion. In general, he believes that the farmer exercises a greater business ability than he is usually credited with.

Owing to England's land system of landlord, tenant and laborer, which stimulates rather large holdings, the subject there receives considerable attention. It may be stated, in passing, that the present system of France has an opposite effect, namely, that it conduces to small holdings. Arthur Young, a writer of the eighteenth century, states, "Deduct from agriculture all the processes that have made it flourishing, and you have precisely the management of small farms." Still another writer says, "A million laborers working for themselves would produce far more wheat than the same land does when cultivated by the most scientific farmers." The one writer evidently had in mind the possible returns from a unit of labor, while the other had in mind the returns from a unit of area.

If it is assumed that the net profit per acre decreases by ever so little as the number of acres managed increases, on account of the inability of the farmer to manage the larger number of acres as

efficiently as a smaller number, it follows as a mathematical necessity that the total profit per farm will increase up to a given size when the profit per farm will decrease, provided other factors do not enter to increase the net profit per acre. The following example will illustrate. Suppose with twenty acres the net profit per acre is ten dollars, and for each additional twenty acres the profit per acre decreases one dollar, then the profit per farm would be as given below:

TABLE SHOWING INFLUENCE OF SIZE OF FARM ON NET PROFIT

Size of farm, acres	Net profit per acre	Net profit per farm
20	\$10	\$200
40	9	360
60	8	480
80	7	560
100	6	600
120	5	600
140	4	560
160	3	480
180	2	360
200	1	200

As will be shown presently, other important factors may enter to change the net profit per acre; nevertheless, the principle here enunciated operates to fix the most profitable sized farm.¹

Is the size of a farm increasing or decreasing in the United States? The following table giving the average size of farm and the average size of improved area is from the United States census of 1900:

¹ Taylor: "Agricultural Economics," Chapter VI.

TABLE SHOWING AREA OF FARMS IN THE UNITED STATES

	Size of farm, acres	Improved area, acres
1850	203	78
1860	199	80
1870	153	71
1880	134	71
1890	137	78
1900	147	72

There has been no material change in the size of the improved area of farms during the past fifty years. During the past decade, however, there has been some increase in the total size of farms in every division of the United States, except the South Atlantic states, in which there has been a steady decrease during the past fifty years. The size of farms has increased most in Western United States, principally due to large holdings of rather poor land in the Rocky Mountain and Great Basin regions.

Although a considerable part of the lands of England has been cultivated for centuries, yet the average size of the improved area is not greatly different from that of the United States. The average size of the area in crops, bare fallow, or grass, was 65 acres in England in 1895, as compared with 72 acres of improved land in the United States in 1900. In England about 60 per cent, and in the United States about 61 per cent of the improved area was in farms of between 100 and 500 acres. The size of the farm holdings, however, is much larger in the United Kingdom of Great Britain than in the United States, since in the former country a greater number of persons own two or more

farms. It has been reported that one-fourth the area is owned by 1,200 persons, with an average holding of 16,200 acres; one-fourth is owned by 6,200 persons, with an average holding of 3,150 acres; one-fourth is owned by 50,770 persons, with an average holding of 380 acres, and the other one-fourth is owned by 261,830 persons, with an average holding of 70 acres. In Great Britain 1,160,000 tenants operate farms averaging 50 acres; while the average size of farms in Ireland is 26 acres.

In general, the farms in continental Europe are smaller than those of Great Britain. In Germany, for example, the average total area (not improved area) per farm was 19 acres in 1896, while in France it was 34 acres; in the United States there are only forty thousand of less than three acres. On the other hand, large farms are more common in Germany, England, and, perhaps, in France than in the United States. The latter country is noted especially for its large number of farms of moderate size, 70 per cent of the total number being between 20 and 175 acres.

What influence has the kind of farming on the size of farms and on the income? The census has classified the farms of the United States by sources of income; that is to say, if the value of the fruits, for example, exceeds that of any other crop and constitutes at least 40 per cent of the gross income, then the farm is classified as fruits. If no class of crops constitutes 40 per cent of the gross income, the farm is classed as miscellaneous.

FARMS CLASSIFIED ACCORDING TO PRINCIPAL INCOME WHERE
FORTY PER CENT OF THE VALUE COMES FROM
PRODUCTS SO DESIGNATED

	Round numbers	Average size, acres	Gross income	Income per acre	Per cent gross in- come on in- vestment
Hay and Grain	1,320,000	159	\$760	\$4.77	16
Live stock	1,565,000	227	788	3.47	16
Cotton	1,072,000	84	430	5.15	42
Dairy produce	358,000	120	787	6.30	17
Vegetables	156,000	65	665	10.21	19
Tobacco	106,000	90	615	6.82	30
Fruits	82,000	75	915	12.22	17
Sugar	7,000	363	5,317	14.63	26
Flowers and plants . .	6,200	7	2,991	431.83	35
Rice	5,700	190	1,335	7.02	43
Nursery products . . .	2,000	82	4,971	60.84	53
United States	5,740,000	147	656	4 46	18

The above enumeration does not include all the farms of the United States. Over one million farms, with an average area of 107 acres and a gross income of \$440, failed to have 40 per cent of the value of the products in any one of the above groups. In studying the results of these tables, it must be borne in mind that they are the figures of one season only, and therefore subject to the influence of the season. The figures are gross. If the labor could be deducted, the net income per acre would be more uniform. In the case of flowers and plants, this undoubtedly represents a large area under glass, the value of land being over \$600, and that of buildings, \$500 per acre.

If, now, we classify farms strictly according to size, we have, according to the census of 1900, the follow-

ing gross income and the percentage on the total investment:

TABLE SHOWING THE GROSS INCOME (PRODUCTS NOT FED TO LIVE STOCK) AND PERCENTAGE OF GROSS INCOME ON TOTAL INVESTMENT

	Gross income	Per cent on total investment
Under 3 acres	\$592	27.8
3-9 acres	203	18.4
10-19 acres	236	22.3
20-49 acres	324	25.4
50-99 acres	503	20.1
100-175 acres	721	17.9
175-259 acres	1,054	16.7
260-499 acres	1,354	16.3
500-999 acres	1,913	16.3
1,000 acres and over	5,334	16.1
Average for the United States	656	18.3

While it is to be expected that the percentage of the gross income on investment (total investment including machinery and live stock) is somewhat greater on the smaller than on the larger area because of the greater labor expended per acre, yet the difference is not striking. About 82 per cent of the farm area of the United States is in farms of one hundred acres or over. Why is the percentage on total investment larger on farms under three acres? Probably much of it is under glass, the crops grown requiring a large amount of labor. Why is the percentage of gross income on farms between twenty and fifty acres greater than upon farms above that area? About 40 per cent of the farms of the size indicated raise cotton. The

table on page 21 shows that cotton returned a gross income of 42 per cent on the money invested.

Thus it will be seen that in the above table it is the kind of farming rather than the size of the farm that has influenced the percentage of gross income on the total investment. Briefly, some of the factors which influence the size of the farm, aside from the kind of farming, are:

1. The contour of the land.
2. Its need of irrigation.
3. The ease of cultivation.
4. Price of the land.
5. The land system.
6. The man.

Generally speaking, where the land is rolling and the topography uneven, the fields are likely to be smaller and the farms of smaller size. It is not possible, on such land, to conduct tillage operations on a large scale.

Bonanza farming has been attempted only where the land is level. On the other hand, where the contour of the land is such as to modify the kind of farming and reduce its value, this may lead to increased size of farm. For example, if the land is of such character as to be fit only for the grazing of sheep, then the farm must be larger, in order to bring in sufficient income.

The farmer in an arid region who owns forty acres of irrigated land is considered to be about as prosperous as an eastern farmer with 160 acres of land. Thus irrigation tends to decrease the size of the farm by increasing its returns.

When land is cheap, men are more likely to speculate in lands and thus increase their holdings. Generally speaking, the higher the price of the land, the smaller the farm. An acre of high-priced land usually brings in a larger income than an acre of low-priced land. Consequently, less high-priced land relatively is required for a livelihood. While the tenant system may not decrease the amount of land owned by a single individual, and may perhaps further tend to increase it, the system does tend to decrease the size of farms under single management. The man's ability or taste may influence the size of the farm.

Some advantages of small farms are:

1. The proprietor can give his personal attention to a greater number of details of the work, and thus have the work more efficiently done.

2. The laborer usually takes a greater interest in the work, and is therefore more efficient.

3. The proprietor himself can devote a larger part of his time to direct labor; while, on a larger farm, his time is devoted to superintendence.

Some advantages of large farms are:

1. But little more capital is required for large than for small farms. Thus the buildings and machinery required for a farm of 160 acres is very little more than that required for an 80-acre farm.

2. Larger fields, which are made possible by a larger farm, make less turnings, less weeds and less insect enemies. In fruit-raising, especially, hedge-rows and fences are a very important factor in harboring insect enemies.

3. Machinery and methods may be employed which would not be economical on a small farm, such as engines, feed cutters, fanning mills, scales and other appliances, by which products may be made more attractive for sale or more valuable for use and by which more accurate records of what is being accomplished may be kept.

4. Large farms attract to them larger capital and riper experience, and often, though not in all cases, result in the highest and best methods.

There are many instances in which the better methods have been employed on the smaller farm, but this is usually on account of the personality of the man, and his ability to give larger personal attention to the work. Men who conduct large farms are likely to be the breeders and improvers of plants and domestic animals, as illustrated in the following quotation:—

"In 1824 Isaac Funk, Sr., settled in McLean county. Locating on the south edge of the 3,000 acres of timber, later known as Funk's Grove, he entered considerable government land and soon became widely known as a successful cattle breeder and feeder. At his death Isaac Funk left an estate of 25,000 acres in one body. His eight sons all followed in the footsteps of their father, breeding and feeding cattle, hogs and sheep as a vocation, some taking up banking and politics as an avocation. Hon. L. H. Kerriek, who married the only daughter of the family, is also widely known as a prominent breeder and feeder of Angus cattle. And now comes the third generation of thirteen brothers and cousins. They have continued

the breeding and feeding of live stock, but have also gone more extensively into the raising of grains in connection with stock. Being familiar with the advantages of pure-bred live stock, it occurred to them that the improvement of grains is just as important as the improvement of live stock. They determined to begin the scientific breeding up of farm crops on a large scale.

"And why not? Who are better equipped for this great work? The members of the second generation are noted not only as successful farmers, but as ranch owners, bankers and merchants. The third generation is composed of strong, well-educated young men, most of them with considerable experience in business. Graduates of the leading colleges, they now have the added equipment of a thorough practical knowledge of agricultural and business operations. They are thoroughly imbued with the importance of breeding field-crops true to a type of increased productiveness."¹

A farm may be either too large or too small. If a certain outfit of tools and farm machinery is correct for 160 acres, and a certain other outfit correct for 320 acres, it is possible that the farm of 240 acres might not be adapted to either outfit, being too large for one and too small for the other.

¹Orange Judd "Farmer."

CHAPTER III

EFFECT OF SHAPE AND TOPOGRAPHY

SHAPE

THE shape of the farm affects not only the shape of the fields, but the distance of the fields from the farmstead, and the possibility of conveniently arranging the fields one with another. The shape of the farm and its influence on the above factors is a subject which should receive much more attention than usually is given. The plans of most farms have grown in a haphazard manner, frequently resulting in a great loss of time in the performance of the ordinary operations.

The plan of the farm depends on the size and shape of the farm, the topography of the land, the nature of the soil, and the kind of farming.

A small farm will require smaller fields than a large one. A farm of 480 acres should be divided into fields of 40 and 80 acres each; and an 80-acre farm would need to be divided into fields much smaller in extent, say 10 to 20 acres. The best size for a farm of 160 acres would be 20- to 40-acre fields. It is not always necessary that these fields be fenced.

Obviously, the shape of the farm has much to do with its arrangement. It is in the buying of ill-shaped farms that farmers make mistakes which frequently

can never be rectified. There is shown in Fig. 3 a farm of 246 acres which extends from north to south rather more than a mile. Such a farm entails a large amount of work that might have been avoided if a block of land 200 rods square had been purchased. The field in which there is a stream is a permanent pasture. It has never been plowed. In order to reach it from the farmstead, the cattle have to be

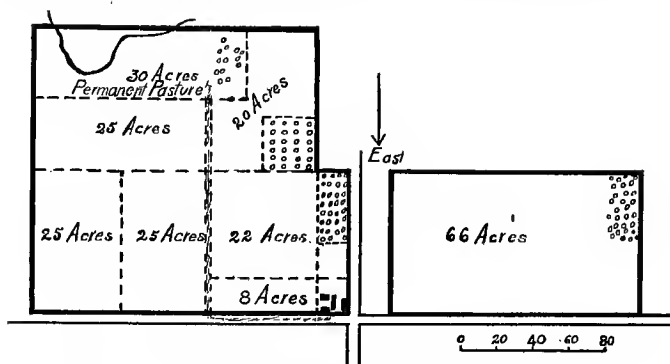


FIG. 3. Example of an inconveniently arranged 246-acre farm.
Compare with Fig. 4.

driven into the public highway. The farthest corner of this field, therefore, is approximately a mile away. During the past forty years, cows have been driven half a mile to pasture in the morning, and driven back perhaps a mile in the evening. What a source of expense this stream has been to the owner! A study of this map will show that many of the other fields are poorly arranged. This is, however, due to its topography as well as to its shape.

In Fig. 4 is shown another actual farm of 400 acres, in which every field on the farm can be reached in less than half a mile. All the fields save one are within eighty rods of the barn. By keeping the

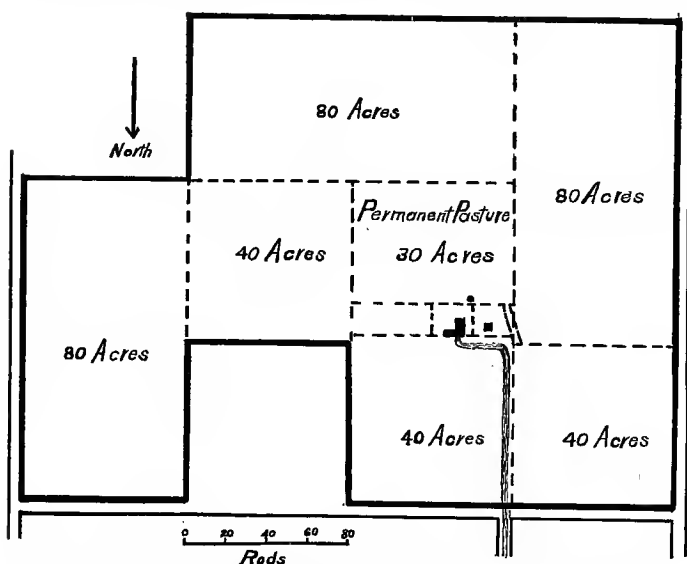


FIG. 4. Example of a conveniently arranged 400-acre farm. Practically every field except one adjoins permanent pasture. Compare with Fig. 3.

small fields south of the barn in permanent pasture, and having in this field an abundant supply of water by means of well and windmill, all the fields on the farm may be pastured without inconvenience, and all fields, except the one at the east, reached directly through this field. In this instance the farm-buildings are back from the road eighty rods. In general,

this would be objectionable; although in this particular case the present location is indicated by the topography of the land. That it is not necessary to be back from the highway in order to be near the center of the farm, is shown by the map of the McKinney farm in Fig. 5. The arrangement of this farm should be compared with that of the McGowan farm shown in Fig. 6.

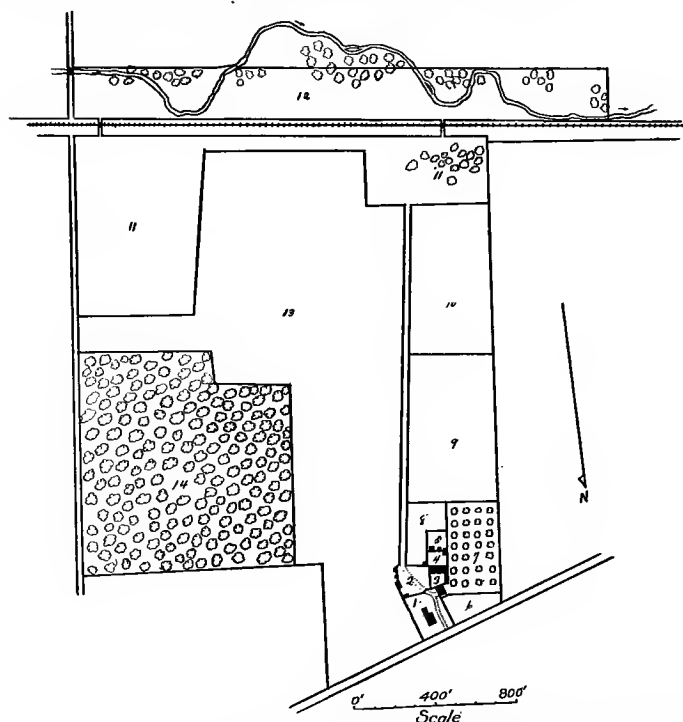


FIG. 6. The McGowan farm, with farm buildings near one corner. Note method of reaching portions of field 11. Compare with Fig. 5.

The nature of the soil affects the shape and size of the field. Other things equal, it is best to have the soil all of one kind in each field. The thickness of seeding or planting different crops, for example, depends in a given locality on the richness of the soil. If the soil of a field is of a decidedly uneven fertility, it is not practicable to have the best thickness for the

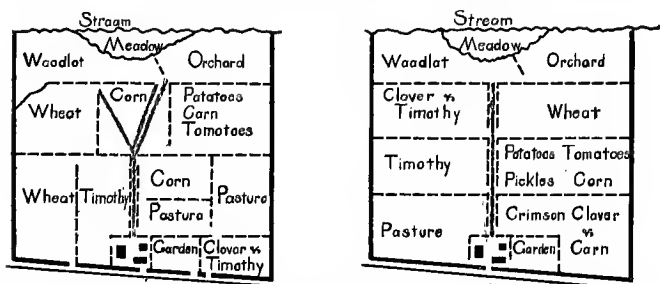


FIG. 7. A 124-acre farm in New Jersey. On the left is the arrangement of fields prior to 1900. In 1900 the owner rearranged the fields and established a six-course rotation as shown on the right.

whole field, or the most economical application of fertilizers. Certain varieties of wheat, as Velvet Chaff, have a stiff straw and are adapted to rich low lands. Other varieties would lodge on such ground or would be better adapted to uplands than those which are successfully grown on low lands. In the selection of a farm, therefore, great variation in character of the soil should be looked on as an objection.

The shape and size of fields are frequently determined by the contour of the surface. Streams, ravines, swamps, hills and stony areas are frequently beyond control. Many times, however, swamps can be drained,

the course of river-beds changed, or stones removed, although the first cost may be considerable, at much less expense than the cost of farming irregular and ill-shaped fields for a lifetime. There is a certain farm on which, a few years ago, a wagon could be loaded with stones without moving it. The story is told of a colored farm-hand who was loading stone on this farm. One day when the manager was passing, the man said, "Mr. Hamilton, it seems to me there's two stuns to one duht." This farm is now considered to be a very fertile one. It raises easily thirty bushels of wheat, forty bushels of maize, fifty bushels of oats and two tons of hay per acre.

The importance of the shape of the farms and the shape of the fields will depend somewhat on the kind of farming, as, for example, whether it is to be largely a stock farm or principally devoted to grain-raising. It will also depend on the method of management. If the practice is to pasture all of the fields more or less, somewhat different treatment will be desirable than if the live stock is to be restricted to permanent pastures and not allowed to go on the fields which are cultivated. The latter is coming to be the practice on farms having clay soils.

Sheep-farming requires small fenced fields, so that the sheep may have frequent change of pasture. With general stock-raising, the fields may be few and large. The shape of the field will not be so important, except in the amount of fences required. With grain-raising, the size of the fields should be governed by the size of the farm, as heretofore indicated; and the shape should

be such as to make the least work in cultivation. Square fields take less fences. Rectangular fields give longer lands in one direction. But inasmuch as all tillage operations require travel in both directions, it follows

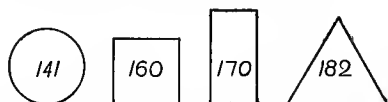


FIG. 8. Rods of fence required to surround a 10-acre field if circle, square, rectangle with length twice the width, or an equilateral triangle.

that, other things equal, the square field is best.

In England, several trials have been made to determine the waste of time in plowing short lands, as compared with long ones. The following table, showing the time required to plow an acre on stubble-land has been selected as representing fairly the results obtained. Although there were exceptions, it will be seen that, in general, the time required to plow an acre decreased as the length of land increased.

TIME TAKEN TO PLOW GIVEN LENGTHS OF LAND		
Length of land Rods	Time taken to plow an acre	
	Hours	Minutes
58	8	
53	8	20.5
51	8	21
25	8	45
18	9	30
8	10	45
7	10	54
14	12	4
11	12	13

The American plan is to have all the farm-buildings grouped together. Generally speaking, the farmer's outbuildings are few in number. Usually, he has horse-

stable, cattle-stable, granary, storage for hay, and tool-house all in one building; sometimes even accommodations for pigs and poultry are added thereto.

The English plan, in general, is to have many buildings, and not infrequently in different parts of the farm. In the winter, the English farmer goes from barn to barn in different parts of the farm to feed his stock. This requires extra work in the winter, but saves time in the summer in drawing crops to the barns, and in hauling manure to the fields. This plan is not likely to be practiced generally by the American farmer; but there are situations and conditions where it is advisable.

Every farmer should have a plan of his farm committed to paper in such a permanent form that it is not likely to be destroyed; the main divisions should be named, lettered or numbered, and be known by these names, letters or numbers at all times. A record should be kept of the more important transactions in connection with each of these divisions.

The following is the form of a daily labor report which may be used in this connection. These daily reports can be filed and the data tabulated at any time or transferred on to any system of records which may be adopted. The simpler the system is, the better. The essential feature is to secure and preserve the original data. The character of the blank will depend upon whether the manager is to make the record or whether each workman. The form given below is designed for individual reports. For forms to be used by manager, see Roberts, "The Farmer's Business Handbook."

DAILY LABOR REPORT

Name of workman _____ Date _____ 19__

Kind of work. Horses used if any. Tools used. Stage of completeness of work, when you quit. etc.	Field letter	Section number	Time worked	
			Hour	Min.
Total time				

N. B.—Use the map of the farm, and be careful to get the right field letters, and the right section numbers worked on. When at all practicable, keep time worked on each field separate.

Make a report on day work is done. If you break any tools, or if any animal or tool with which you have to do needs attention, or both, call attention to same and record it on the reverse side of this card, in which case underscore this line.

TOPOGRAPHY

The contour of the farm may affect easily the adaptability of the farm to the production of certain crops. Lands lying in valleys are well known to be unsuited to the culture of most fruits, because of the danger from late frosts in the spring. The same valleys are generally well suited to the production of maize and potatoes, probably because of the greater supply of available plant-food, and because of the natural subirrigation that takes place from the gradual flow of underground water from the hillsides into the valley. The production of certain crops is often materially influenced by the direction in which the land slopes. In certain localities, a northern slope may be best for certain varieties of fruit, such as strawberries, because

it prevents them from blossoming too early in the spring, and thus from being killed by frost; while a southern slope would be more desirable for vegetables, because of its greater earliness. Other things equal, the eastern slope is better than the western slope, because the temperature is more equable.

The topography of the land as affecting the loss of soil fertility and the washing of gullies must be con-

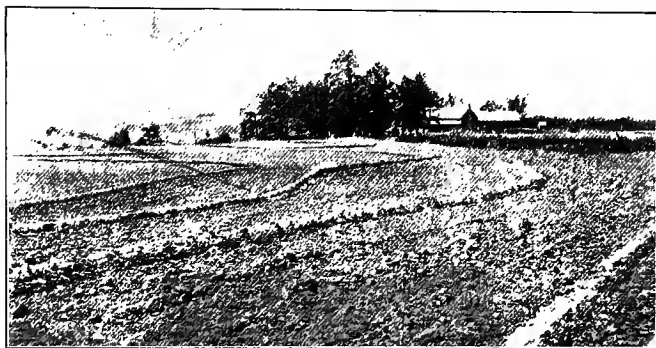


FIG. 9. Plowing along contour lines in Mississippi to prevent washing; sometimes called circle plowing.

sidered. This is especially important in the southern states, where the land is not sufficiently frozen or covered with snow to prevent erosion during the winter. In many portions of the southern states, what is known as circle plowing,—that is to say, plowing in beds along the contour lines,—has to be practiced in order to prevent erosion. These terraces are a common feature of the landscape, and greatly influence economy of production.

Topography influences not only the draft and the efficiency of our improved machinery, but also the character of the machinery best adapted to given farm operations. Wheel-plows are desirable in level sections, since the wheel serves to convert the sliding friction of the plow into a rolling friction of the wheels and, in general, add to the efficiency of the operation, since the plow is held more firmly in place than with the walking plow. Where the land is rolling, however, the walking plow is desirable, since in the wheel-plows the extra weight of wheels and rider, if any, must be lifted. No mechanical device can reduce the power required to lift this additional weight from one level to another.

In connection with topography, the altitude with reference to sea-level is a more important consideration in connection with the agricultural possibilities of a piece of land than is usually recognized. In the North Atlantic states, land that is above 1,000 feet elevation has generally a distinctly different crop adaptation from land that is under 500 feet elevation, due to differences in climatic conditions. The climate, however, is not the only factor affecting the value of these lands, since they are usually deficient in railway and other transportation facilities.

CHAPTER IV

NATURAL AND ARTIFICIAL ASPECT

FERTILITY

THE fertility of the soil is, of course, one of the prime factors in determining the value of the land. Business men are wont to say that it is better to pay a high price for a fertile farm than to take an unfertile one as a gift. This is based upon the fact that it requires the same expenditure, or even more, to manage a poor farm as it does to manage a fertile farm, and that the interest on the farm investment is, or should be, the minor part of the expenditure. Many instances are known of men who loan money on lands in the same locality which are worth seventy-five and twenty-five dollars respectively, on account of the difference in their crop-producing capacity. A cow which does not give enough butter-fat to pay for her keep is worth less than nothing to her owner. If a cow giving 200 pounds of butter-fat makes a profit of ten dollars, one which gives 300 pounds of butter-fat will make several times this profit, and is worth much more money. It is just so with a farm. The increased productiveness of a farm increases the value of a farm out of all proportion to the increase in productiveness.

It should be borne in mind, however, that fertility of the soil is not an absolute thing, but bears some

relation to the crops to be raised. Some land which, as in southern Illinois, is ill adapted to the growth of maize, wheat, oats and hay, has been found to be admirably adapted to the growth of apples; while the distinctively fertile maize lands of central Illinois are ill adapted to the growth of apples. Certain loose, sandy areas in Germany which were considered waste lands, now raise tremendous crops of asparagus. The best truck lands of the Atlantic seaboard will not successfully raise wheat or grass. Furthermore, the same land, while decreasing in its ability to raise a given crop, may be increasing in its ability to raise another crop.

In estimating the value of land, its natural fertility must be considered,—that is, its ability to withstand cropping for many years; and its condition,—that is, whether its crop-producing power has been temporarily reduced by bad husbandry or otherwise; and how much it will cost in fertilizers and in management to bring the land into a proper state of productiveness.

There are four methods which have been employed in an endeavor to determine the fertility or crop-producing power of the soil:

1. A chemical analysis may be made of the soil by which it is sought to determine the per cent of the different chemical elements, their combination and their availability for crop growth by which is generally understood the solubility of the elements or their compounds. Should a soil be markedly deficient in a single element, a chemical analysis would be helpful in suggesting the proper line of treatment. Usually, however,

the crop-producing power of soils is limited by other factors than the percentage of the essential elements, or else percentages too small to be detected by ordinary methods of sampling and analysis modify the growth of crops. The application of ten pounds per acre of nitrogen in the form of nitrate of soda often influences the yield of a crop. This quantity of nitrogen distributed in 3,000,000 pounds of soil,—which is the weight of an acre of soil to the usual sampling depth,—is too small to be detected by the ordinary soil analysis. Agricultural chemists do not undertake to predict the fertility of a soil from analysis, and persons wishing to purchase farms should not submit samples to them for this purpose.

2. A mechanical analysis of the soil may be made by which it is sought to determine the plasticity or friability of the soil; to determine its water-holding capacity and the ability of the soil to furnish the plant with water and the plant-food contained in the water. The amount of water a soil will hold depends, in large measure, on the extent of the surface of the soil-particles or grains. Whitney has shown that the surface area of the soil-grains in the subsoil of four soils stood in the following relation to one another: Pine barrens, 1; truck, 3; river terrace, 6; limestone, 11. The surface area of a cubic foot of the subsoil of the river terrace soil was equal to 2.3 acres, assuming each grain to be free and not cemented to another grain. When one reflects what a large amount of water may adhere to a pane of glass 2.3 acres in area, it is not difficult to understand how

a soil may hold large quantities of water, and how different soils may hold quite different amounts.

While a mechanical analysis is helpful, especially in a scientific study of soils, it has been found difficult thus far to interpret such analyses, since the

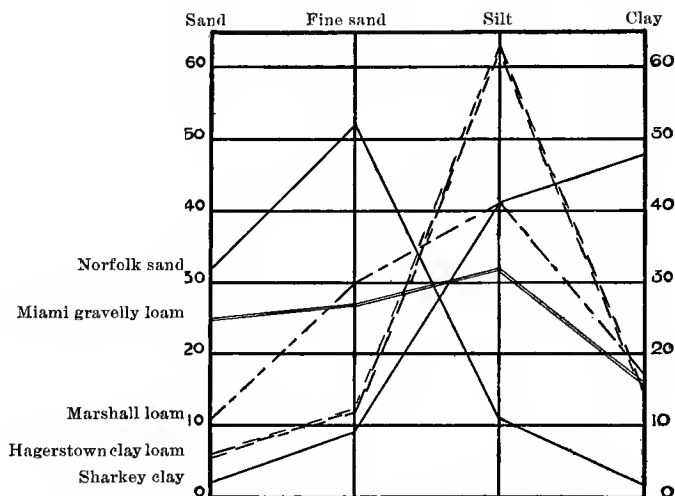


FIG. 10. Five important American soil types. Norfolk sand; typical early truck soil: Miami gravelly loam; fine for general agricultural purposes: Marshall loam; prairies of northwestern United States: Hagerstown clay loam; strong soil for general agricultural purposes: Sharkey clay; buckshot land, fertile when drained. Each is a fertile soil for certain crops under suitable conditions. Note the similarity in the clay content of three of these soils, all good for general agricultural purposes.

combinations of sizes of the soil-grains are infinite, and many different combinations may bring about the same physical effects. For example, a soil composed of a large amount of silt and a small amount of sand and clay may have the characteristics of a soil containing nearly equal amounts of sand, silt

and clay. Moreover, soils of the same texture are influenced by topography, drainage and climatic conditions. Doubtless the percentages and character of the gravel are not without influence in modifying heat and moisture. In addition it is recognized that soils have not only texture, but they also have structure. The texture of a soil is an expression of the constituent particles; while the arrangement of the soil-grains, which may be "cemented" together in such a way as to act after the manner of larger soil-particles, or may be grouped together so as to form large spaces in the soil, gives rise to structure. Texture only is determined by mechanical analysis; while structure is probably one of the most important factors in determining the crop-producing capacity of the soil and one that may be largely modified by judicious tillage, manuring and drainage.

3. The physical properties of the soil may be determined by visual examination. The difference between a sticky clay and a loose, sandy soil is readily recognized. To recognize the finer shades of difference in the physical properties of soil requires careful observation, large experience and good reasoning faculties. Care should be taken to see the soil under different conditions of soil-moisture, and, if possible, to see it plowed under such varying conditions. It is important to examine the subsoil, as well as the surface soil, to the depth of at least three feet. For this purpose the soil-auger described on page 75 may be used. Men of experience become expert in judging soil just as they do in judging wool, or butter, or tea. If the

would-be purchaser of a farm is without experience, he would do well to seek the advice of a trustworthy farmer in the immediate neighborhood of the farm under consideration. The Bureau of Soils at Washington is now giving rigid training in this line to a staff of men who make soil surveys.

4. The kinds of plants growing naturally on the soil is a good indication of its fertility. In a new country it is the best means of judging the fertility, and was, and still is, the one most frequently relied on by the pioneer. In the wooded areas the trees native to the area receive chief attention. While not an absolute guide, especially in the older regions where a rotation of trees may have occurred, it is of prime importance when taken in connection with the history of the farm in question. Care must be exercised, because the same species of trees may give different indications in widely separated regions on account of climatic differences.

In addition to the mere occurrence of plants, their growth and general appearance and relative proportions of different species indicate the nature of the soil, and in some cases the climatic conditions. Trees head lower in hot, dry climates. The cypress loses its "knees" when grown in comparatively dry soil. The relative preponderance of white oak and beech is indicative of the soil. The more white oak, the better the soil; and the more beech, the poorer the soil. White oak, however, never indicates the best soil. Bur-oak indicates a better soil than white oak.

In general, among trees, a fertile soil is indicated

by basswood, crab-apple, wild plum, black walnut, ash and hard maple.

Among herbaceous plants, ragweed, bindweed, plants of the sunflower family—such as goldenrod, the asters and wild sunflowers—indicate the fertility, not only by their occurrence, but especially by the character of their growth. In general, leguminous plants indicate a good soil, although wild leguminous plants may be relatively abundant in soils deficient in nitrogen. In comparing grasses with sedges, the former indicate the better soil. Sedges most frequently indicate wet soil, although some species grow on dry, sandy soil; when a wet soil, it may be made fertile by drainage.

It is well known that chestnut trees generally occur on sandy soils containing a low percentage of lime, and seldom grow on soils containing a high percentage of lime. Soils containing high percentages of lime are usually fertile soils. Chestnut trees are, therefore, to some extent, an indication of poor soil, although there are exceptions. It has been shown that none of the plants of the heath family—such as huckleberry, blueberry, cranberry and wintergreen—grow on soils containing high percentages of lime. A soil containing over 2 per cent of lime would be considered to have a high percentage of this constituent. With regard to the use of trees as indicating the soil in Ohio, Dr. Orton, than whom there was no better authority, says:

"The native forests of the drift regions were, without exception, hardwood forests, the leading species being oaks, maples, hickories, the walnut, beech and

elm. The walnut, sugar-maple and white hickory, and, to quite an extent the bur-oak, are limited to warm, well-drained land and largely limestone land. The upland clays have one characteristic, an all-important forest tree, viz., the white oak. It occupies vastly larger areas than any other species. It stands for good land, though not the quickest or most generous, but by intelligent management farming can always be made successful on white oak land. Underdraining is almost always in order, if not necessary, on this division of our soils.

"The regions of sluggish drainage . . . are occupied in their native state by the red maple, the elm and by several varieties of oak, among which the Spanish swamp oak is prominent.

"The character of the land when its occupation by civilization was begun in the last century was easily read by the character of its forest growths. The judgments of the first explorers in regard to the several districts were right in every respect but one. They could not do full justice to the swampy regions of that early day, but their first and second lands fall into the same classifications at the present time. In the interesting and instructive narrative of Col. James Smith's captivity among the Indians, we find excellent examples of this discriminating judgment in regard to the soils of Ohio as they appeared in 1755.

"The 'first class' land of that narrative was the land occupied by the sugar-maple and the walnut, and it holds exactly the same place today. The 'second class' land was the white oak forests of our high-lying

drift-covered districts. The 'third class' lands were the elm and red maple swamps that occupied the divides between different river systems. By proper drainage, many of these last-named tracts have recently been turned into garden soils of Ohio, but, for such a result, it was necessary to wait until a century of civilized occupation of the country had passed."¹

PHYSICAL PROPERTIES OF THE SOIL

Physical properties affect productiveness, and presumably would be considered in coming to a decision as to the crop-producing capacity of the land in the preceding section. Under this section of the score card the physical properties as affecting economy of production, number of days of labor, and loss of soil fertility, will receive attention.

The physical properties of the soil affect materially the economy of production. In England it is estimated that on heavy clay soils one team is needed for each sixty acres under cultivation; while on sandy soil one team for eighty acres is needed. Estimates seem to indicate that in the United States one horse of working age is kept on farms for every thirty-three acres of improved land. This includes breeding animals, but does not include horses and mules of less than working age. Improved land in this country, however, includes pasture-land.

Physical properties of the soil also affect the number

¹ Howe's "History of Ohio"; article, "The Geography and Geology of Ohio," p. 87.

of days in the year during which labor can be applied to it. Sandy and loamy soils can be worked earlier in the spring and less time must elapse after each rain before they can be worked again than with clay soils. In the case of clay soils, therefore, the same labor must be done in a less number of days, and extra men and teams must be kept to be ready to do this work.

DRAINAGE

Whether the underdrainage is sufficient for the needs of the farm for the purpose intended must be considered; if found to be insufficient, the cost of artificial drainage must be calculated. While it may require \$25 to \$30 per acre thoroughly to drain a farm with tile, yet an expenditure of from \$5 to \$10 per acre in tile drainage on a 100-acre farm will usually bring about very marked results where drainage is needed. It is well to consider whether \$10 per acre expended on underdrainage on a farm valued at \$40 per acre may not be wiser than a purchase at \$50 per acre of another farm not needing drainage. The need of drainage will depend on the character of the soil, topography of the land, and the amount of crops to be raised. If alfalfa, clover, potatoes and maize are to be the chief crops, underdrainage may be necessary where it would not be if blue grass pastures and timothy meadows composed the principal part of the farm.

CONDITION

A farm may be fertile, but before the land can be used profitably for farming, it may be necessary to remove stones, clear away underbrush, and grub out stumps. The cost of these operations will vary greatly under different conditions. The stumps of some trees, for example, are very difficult to remove; while those of other trees, especially in two or three years after the trees are cut, can be easily cleared away. In certain localities obnoxious weeds, which can be eradicated only with great difficulty, may reduce the value of the farm. The abundance of comparatively harmless and easily destroyed weeds may reduce the productiveness of a farm for one or more years, or may increase the cost of cultivation. These factors frequently prevent a farm from being profitable for one or more years.

The cost of clearing land of stumps, underbrush or trees may vary from a few dollars to \$40 or more per acre, depending on a great variety of circumstances, among which may be mentioned the character of the soil, as, for example, whether it is stony, swampy, sandy or clayey, the number and size of the stumps or trees, the character of the root system, the time required for the stumps to decay, and the ease with which the trees reproduce themselves by sprouting. Coniferous trees do not reproduce by sprouting, while the broad-leaved species possess this habit to a greater or less extent, although in a widely varying degree.

Among the trees that have this habit in a marked

degree may be mentioned the willow, poplar, locust, persimmon, chestnut and sassafras. This habit will vary in the same species, depending on soil and climatic conditions. Locust, cedar, chestnut, white oak and white pine stumps are extremely durable; while other species of oak and pine, maple, cottonwood, hickory, ash, tulip and poplar decay much more readily.

It is convenient to divide the root systems of trees into three classes, viz., (1) trees with tap-roots; (2)

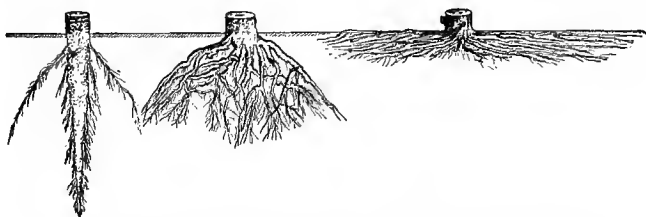


FIG. 11. Types of root systems of trees. Reading from left to right: tap roots, semi-tap roots, lateral roots.

trees with semi-tap roots; (3) trees with lateral roots only. Hickory, black gum and white oak are illustrations of the first; pine, poplar and chestnut, of the second; and elm, soft maple, locust, dogwood and alder, of the third. While the stumps are more easily removed when the root system is shallow, it is less difficult to plow among the stumps of tap-rooted trees. Thus, until they are removed, the stumps of trees with lateral roots are more objectionable than those with tap-roots.

CHAPTER V

METEOROLOGICAL CONDITIONS

CLIMATE

It is obvious that all the above conditions may be perfect, yet if the climatic conditions are unfavorable, as in the arid districts of the West, the land will be valueless. While the influence of climate upon flora and fauna has long been recognized, the influence of the climate as an economic factor has not generally been recognized as it should be. This has been due, in part, to our lack of knowledge in the past of actual climatic conditions and their influence on the growth of economic plants; and in part to the fact that we cannot materially change the climate of a particular region. The latter is not a matter of importance to the man who wishes to select a farm, since he is free to choose the locality having the climate most desirable for his purpose or most acceptable to his taste.

The Weather Bureau of the United States Department of Agriculture is acquiring, as time goes on, accurate data concerning climatic conditions for all parts of the United States. The total amount of rainfall, its distribution throughout the year, the temperature and average time of last spring frost and the earliest fall frost, are all matters of importance to

the prospective purchaser of a farm. These questions have been studied by the Weather Bureau and the results are available to every citizen. Even the areas most likely to be visited by tornadoes have been studied.

The climatic conditions affect not only the production of crops, but also the cost of raising plants and animals, by influencing the number of days of labor, and the amount of food and shelter required. The experiments made at the Missouri Experiment Station seem to indicate that for beef-cattle in the climate of Missouri, better gains can be made for a given amount of food under open sheds than when the cattle are in stalls in warm barns. The results of these tests have led the director of the station to remark that the farmers of Missouri have more farm-buildings than they need for the economical production of live stock. What would be true for beef-cattle in Missouri, however, would not be true for dairy cattle in, say, the North Atlantic states.

HEALTHFULNESS

Healthfulness is a factor that has been dwelt on by writers from the earliest times. Columella, writing of the agriculture of Europe in the first century of the Christian era, says, with regard to the selection of land, that there are two things chiefly to be considered: the wholesomeness of the air and the fruitfulness of the place. "Of which, if either the one or the other should be wanting, and notwithstanding any one

should have a mind to dwell there, he must have lost his senses and ought to be conveyed to his kinsfolk to take care of him." Usually, healthfulness has been discussed from the standpoint of a home. A person is, of course, justified in paying any price which he can afford in order to secure a healthful location as a home. No money value can be put on a location for this purpose. On the other hand, it must be recognized that people do live in all parts of the United States and that not all parts are equally healthful. The healthfulness of a farm should be considered, therefore, also from the standpoint of an investment.

WATER-SUPPLY

Stockmen generally prize live water, by which they mean running water. It is generally the first question asked by a man concerned chiefly in raising live stock. Undoubtedly, for a stock farm, running water is, in itself, a very desirable thing, provided it is not secured at too great a disadvantage in other respects. In these days of good pumps and windmills, however, it is a question how much irregularity and loss of land area, how much overflow or other attendant ills can be afforded for running water. The expression, "It is a well-watered farm," undoubtedly has an important significance, but in purchasing a farm, it is well to balance the cost of a complete artificial water-system against these losses.

The character and permanence of the water-supply must never be overlooked; and if it is not entirely

satisfactory, an inquiry into the probable cost of securing a satisfactory supply should be made. No doubt should be permitted on this question; and if there is any doubt as to the quality of the water, samples should be submitted to an expert for analysis.

CHAPTER VI

LOCATION

THE appraisement of farm land in Ohio, in 1890, varied in different counties from an average of six dollars in Hocking county to sixty-nine dollars in Hamilton county. The fact that the average appraisement of the glaciated counties in Ohio was twenty-six dollars and thirty-six cents, and of the non-glaciated counties, fourteen dollars and fifty-two cents, is evidence that fertility and topography materially affect the value of farm lands. The fact that the appraisement of farm lands in Hamilton county, of which Cincinnati is the county-seat, was twice that of Cuyahoga county, of which Cleveland is the county-seat, is also evidence that fertility affects farm values.

On the other hand, the fact that the average appraisement of ten of the most fertile counties in southwestern Ohio was but thirty-four dollars per acre, while Hamilton county was sixty-nine dollars, shows that location has a marked influence. The appraisement of Montgomery county, with Dayton as county-seat, was fifty-one dollars; while the other nine counties surrounding it had an average appraisement of twenty-nine dollars, all being of somewhat uniform fertility. The appraisement of Franklin county, with land of ordinary fertility, was forty dol-

lars; while the appraisement of Madison, Fayette and Pickaway counties, which have a high reputation for fertility, was less than thirty dollars per acre. It does not follow, of course, that a county which has a very low average appraisement does not have any valuable and high-priced land. The average appraisement of Gallia county was nine dollars; while along the Ohio River there are probably many thousands of acres of fertile soil, well located for shipping products by boat, which are worth one hundred dollars per acre.

There were six counties in New York State in which the farm land was valued at more than one hundred dollars per acre. These were New York, \$2,240.17; Kings, \$1,566.64; Queens, \$575.28; Richmond, \$496.49; Nassau, \$189.02; Westchester, \$149.06. The total area owned in farms in these six city counties was 316,602 acres, which is somewhat less than the average of a single county in New York State. The valuations mentioned are probably due to the prospective value of the localities as building sites rather than to any agricultural value which they possess. Leaving out of account, then, these six counties, the average valuation by counties of the farm lands of New York State, in 1900, varied from ten dollars and fifty-eight cents in Hamilton county, in the Adirondacks, to ninety-two dollars and forty-seven cents in Monroe county, where Rochester and the fruit industry have influenced the value of farms.

Some interesting comparisons may be made between the several counties in western New York. In the three

counties bordering the Pennsylvania line, of Cattaraugus, Allegany and Steuben, the average valuation was approximately twenty-nine dollars per acre. In the five interior counties of Genesee, Wyoming, Livingston, Ontario and Yates, the average valuation was approximately forty-seven dollars; and in the four counties bordering the Lake, of Niagara, Orleans, Monroe and Wayne, the average valuation was sixty-eight dollars. If we add to these four counties Erie, where Buffalo is located, the average valuation of farm lands in the five counties would be seventy dollars. The three counties of Seneca, Cayuga and Onondaga form a group with an average of fifty dollars per acre; while the seven counties of Schuyler, Tompkins, Cortland, Chenango, Chemung, Tioga and Broome form another rather well-defined group with an average of thirty-one dollars per acre. The six counties along the Hudson River, of Dutchess, Columbia, Rensselaer, Albany, Greene and Ulster, had a valuation of thirty-five dollars. In certain ways, at least, these six are the best located counties in the state in regard to markets; but they were valued at only one-half that of the five counties just named bordering Lake Ontario.

One of the explanations given of the low valuation of lands in these counties is that much of the land is owned by rich men in large holdings and so is not a very desirable place to own a farm as a home. If this is true, sociologic, rather than economic reasons control the value of this land. Another, and probably truer, explanation is that these counties contain a larger proportion of waste land or land that can be cultivated

only with difficulty. These are evidences that both fertility and location affect the value of farm lands.

Mr. E. Merritt, who has studied the distribution of farm products in New York State and the reasons therefor, has divided the state into four regions, exclusive of the Long Island counties, as follows:

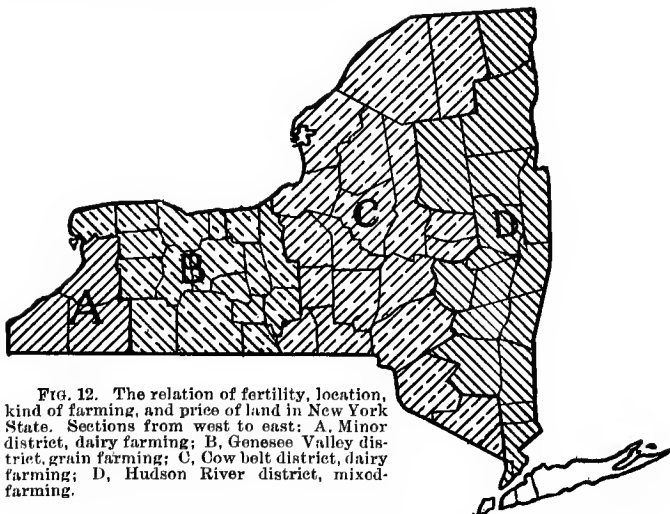


FIG. 12. The relation of fertility, location, kind of farming, and price of land in New York State. Sections from west to east: A. Minor district, dairy farming; B. Genesee Valley district, grain farming; C. Cow belt district, dairy farming; D. Hudson River district, mixed-farming.

A. Minor district, dairy farming; B. Genesee Valley district, grain farming; C. Cow belt district, dairy farming; D. Hudson River district, mixed farming. The map on the preceding page shows the counties in each division. This classification is based upon the character of the agriculture. The character of the agriculture is based, in turn, on all the factors which enter into agricultural conditions, one of which is soil,

including topography, and another is location. To what extent soil has influenced this classification may be judged by the following soil map. The average valuation of all land in farms in the different districts is as follows:

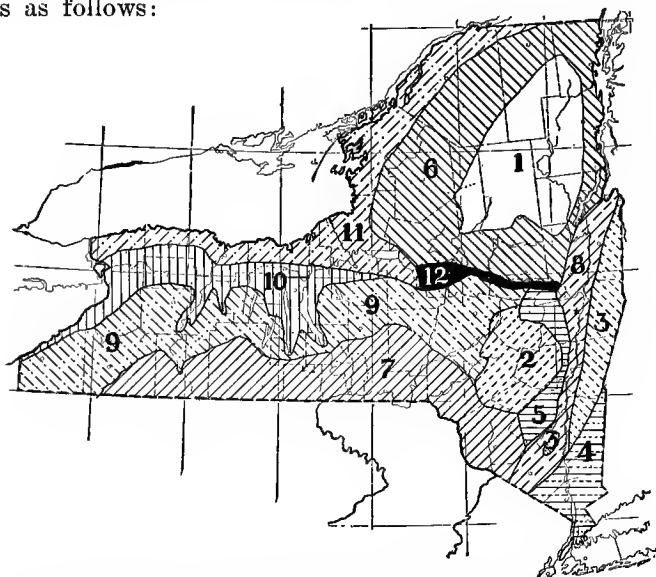


FIG. 13. Map of New York State, showing the soil areas: 1, Adirondack; 2, Catskill; 3, New England; 4, Highland; 5, Catskill plateau; 6, Adirondack plateau; 7, Appalachian plateau; 8, Hudson Valley; 9, Central New York plateau; 10, Erie plain; 11, Ontario; 12, Mohawk Valley. Compare with Fig. 12.

Hudson River district, \$27; Cow belt district, \$18; Genesee district, \$29; Minor district, \$33. If we assume that the unimproved land has no value, we may estimate the value of the improved land by dividing the total value of the land in each district by the area of improved land. The results are as follows:

Hudson River district, \$33; Cow belt district, \$27; Genesee district, \$36; Minor district, \$41. It will be seen that the variation in the value of the improved

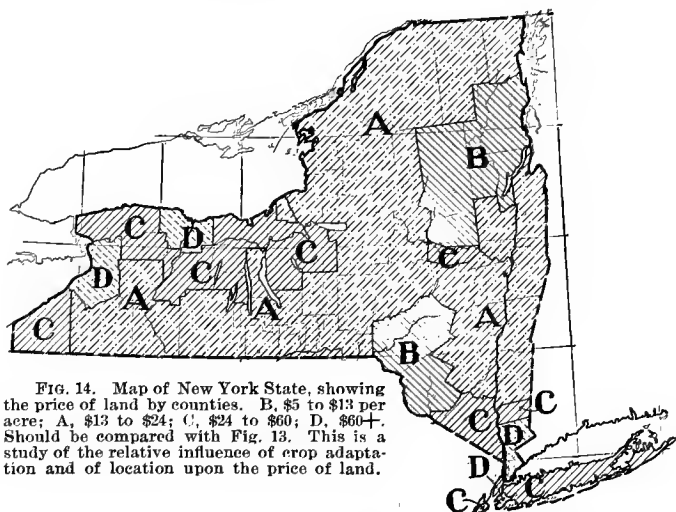


FIG. 14. Map of New York State, showing the price of land by counties. B, \$5 to \$13 per acre; A, \$13 to \$24; C, \$24 to \$60; D, \$60+. Should be compared with Fig. 13. This is a study of the relative influence of crop adaptation and of location upon the price of land.

land, if this can be taken to be a true value, is much less than the variation in the value per acre of all lands in farms.

The local market is often of considerable advantage for the sale of the minor products of the farm, even when the major products are shipped to a distant market. It is related in one instance that a thrifty housewife kept an accurate account of her poultry sales for forty-five years, and found that in that time she had sold ten thousand dollars' worth of such products, or about two hundred dollars per year. It

happened that in the same time her husband had bought and paid for a farm worth ten thousand dollars, which represented their net savings. In other words, the remainder of the products of the farm had gone to support the family, while the housewife had purchased the farm.

A town of twenty thousand inhabitants may make such a local market for maize, oats or hay as materially to increase the price, not infrequently 10 to 20 per cent. A local market which will make possible the sale of milk at five cents per quart will increase the gross returns from the sale of milk two or three times what could have been realized during the past ten years, if it were made into butter and cheese. The mere fact that local markets exist for the purchase of needed materials and supplies is an indication of their economic importance to the neighboring farms.

Good neighbors, from a moral and social standpoint, are, of course, of inestimable value. But neighbors also have an economic value. If one's neighbors raise large quantities of apples of good quality, the fact will make a market for one's apples, by bringing to the neighborhood buyers from a distance. If they raise good horses or good cattle or good hay, buyers will seek the neighborhood, and will seek one's products; thus one will be relieved of the necessity of hunting a market. In the case of horses, it is practically impossible for the average farmer to raise good horses, unless his neighbors choose also to raise good horses of the same breed. If enough winter lambs are produced contiguous to the railway, the railroad will gladly send a refrigerator car along its line at stated intervals, so that dressed car-

casses can be sent by freight to market. The cost of transportation may thus be decreased one-half. For example, certain sections in the North Central states can market their winter lambs quite as cheaply as farmers of the North Atlantic states, because the former use refrigerator freight while the latter have only express. The farmers of northern Illinois and southern Wisconsin have had better facilities for getting creamery butter to New York and Boston than the Indiana and Ohio farmers, because in the former region nearly every community has a creamery.

It is the experience of many manufacturing industries that while the natural conditions and advantages were the cause of the beginning of the industry in a given locality, its later growth was due to the mutual advantages to be found by establishments of the same kind being near one another. We find slaughter-houses at Chicago, Kansas City and Omaha; plow manufactories at Moline and Rock Island, Ill.; woolen manufactories at Philadelphia; silk manufactories at Patterson, N. J.; cotton manufactories at Lowell, Mass.; furniture factories at Grand Rapids, Mich., and breakfast foods at Battle Creek. Natural advantages in most instances caused the location of the first factories. Others were subsequently located because the subsidiary businesses and artificial conditions, such as abundance of skilled labor, made the highest success possible in that place. In some cases, notably in the case of breakfast foods, it is largely a matter of advertising.

Exactly the same principle applies to farming. Farmers, as well as railroad companies, have a com-

munity of interest, but they do not always realize it. A certain county in New York is noted for the raising of a certain breed of cattle. Into one portion of this county has gone a well-known and very high-class breeder of another breed of cattle. Some of the farmers of this community are now considering the advisability of disposing of their cattle, and taking up the breeding of cattle of the same breed as that of the newly arrived breeder. These men are not particularly noted for the breeds which they are breeding; and it is their idea that this newcomer, who is a high-class breeder, will bring to that community buyers for his class of cattle, and it will be to their benefit to be breeding cattle of the same breed. This has been a sound business principle in almost all manufacturing industries.

Shipping facilities are of greater importance than is generally realized. Many advantages are to be gained by locating on a main transcontinental line. A farm that is forty miles from Cleveland, Pittsburg, Buffalo or New York, from which products can be got to these markets only by a change of cars, is generally farther away, from an economic standpoint, than the farm that is seventy-five miles away, but on a main line. The freight rates from Chicago to points in St. Lawrence county, New York, are the same as between Chicago and Boston. The farmer, therefore, living near Boston on the Boston and Albany railroad can purchase western grain for his dairy cows at the same price as the St. Lawrence farmer. On the other hand, farmers who live within hauling distance of these

lines of railways and maintain milk routes to New York are the only ones that can economically ship milk to the city. It thus happens that farmers in parts of St. Lawrence, Jefferson and Herkimer, and other counties in the so-called "cow belt" are, for the purpose of shipping milk, nearer New York City than some of the farmers who live in Rensselaer, Columbia and Dutchess county, a few miles back from the Hudson River.

The number and character of the trains that stop at the shipping point is a matter of vital importance, especially if freight shipments are desired. The distance from the shipping point is also a matter of importance, but will vary greatly with the kind of farming. Milk may not be economically hauled more than three miles to shipping stations, creameries or cheese factories. Five miles is a long haul for graius. If the products, however, are turned into beef, pork or mutton, a distance of ten miles would not be important from an economic point of view.

Distance is not, however, measured only in miles. The character of the road-bed and the grade must be considered. One may travel two miles on one road as easily as one mile on another. A road is like a chain: it is no better than its weakest point. One quagmire or a steep hill may materially rednee the hauling capacity of five miles of otherwise good road. Milk may be economically hauled four miles over a macadamized and fairly level road where it could not be hauled two miles over an unimproved and hilly highway. Good roads usually add more than their

cost to the commercial value of the farm, because of the greater social and intellectual advantages which they afford. In some cases, lands have been sold along improved highways by those not appreciating these advantages and farms purchased elsewhere where lands of equal agricultural value could be obtained for less money.

It seems certain that the commercial value, probably the agricultural value, of farms in many states is to experience a readjustment on account of the electric railroads which have been built or are now building. It seems not unreasonable that a farm on an electric railroad three miles from town will be more highly prized than a farm only one mile from town without such facilities. The social surroundings may be even better three miles than one mile from town. Telephones are, on the other hand, likely to offset the disadvantages of distance, both in a social and in an economic way. Visits by telephone seem to be quite as enjoyable to some as the old-fashioned way and do not require dress suits. A purchase can be made by telephone often quite as well as by personal solicitation, and other business matters can be adjusted much more expeditiously. No farmer who transacts business worthy the name can afford to be without this adjunct to business.

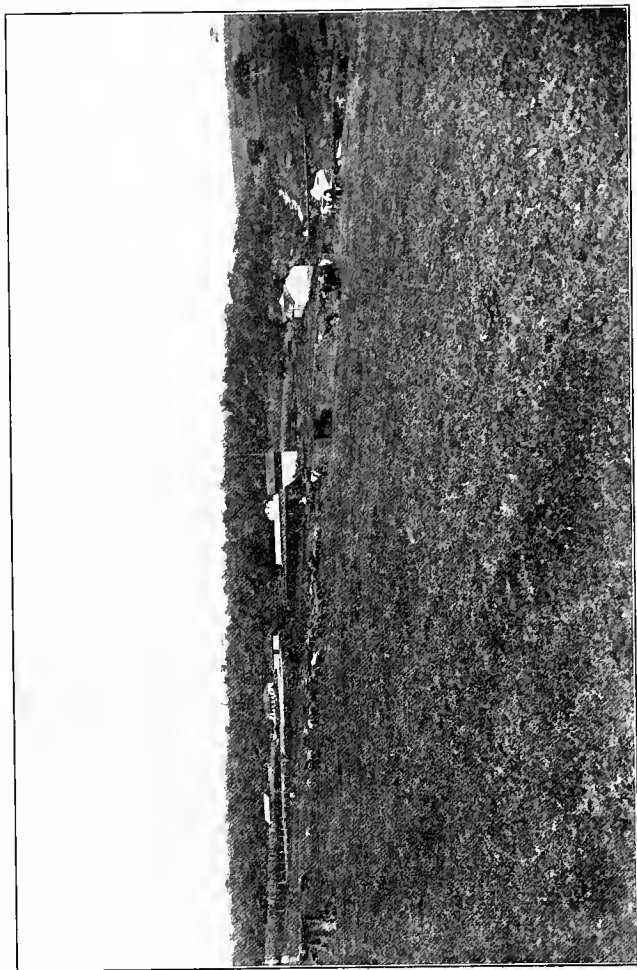


FIG. 15. The arrangement of that portion of a farmstead in Brazil known as the "Casa de Morada," showing the residence of the owner and drying grounds for coffee on the left, the store house for coffee in the center and building containing coffee-cleaning machinery on the right. The stream furnishes power for running machinery.

CHAPTER VII

IMPROVEMENTS

BUILDINGS AND FENCES

LOOKED at from the standpoint of an investment, what expense may be safely put into improvements on a farm? Obviously, this will depend on many factors, such as character of the farming to be pursued, and the climatic conditions.

According to the census of 1900, the average value of farm-buildings per acre in the United States was \$4.25, which was 21 per cent of the total value of the farm lands, including these improvements. The average value per acre of the improvements in Massachusetts was \$22, or 45 per cent of the total value of the land; while in Alabama it was \$1.70 per acre, or 25 per cent of the value of the land. In Ohio, it was \$8.80 per acre, or 21 per cent of the value of the land; while in New York State it was \$15 per acre, or 38 per cent of the value of the land.

From an economic point of view, it is possible that, for general farming, it is not wise to invest more than one-fourth the aggregate value of the farm in buildings of all kinds. However desirable and justifiable improvements may be from the standpoint of a home, an expenditure beyond this percentage is not likely proportionately to increase the commercial value of

the farm or its economic returns. This is one of those general rules to which there will, of course, be many exceptions.

On the other hand, even though the farm is to be leased, a good farm dwelling has an economic advantage. Unless the house affords the ordinary comforts, a desirable tenant will not be obtainable. Losses, both direct and indirect, occur from the lack of suitable barns and other outbuildings. Where twice the food can be obtained from an acre by putting maize into the silo instead of raising timothy hay, it would seem that on a 300-acre farm a few acres might be spared, if need be, and the money thus obtained used to build a silo. If, by producing twice the manure, the crops can be greatly increased per acre, it would seem that a few more acres might be spared and a covered barnyard or a manure-shed built with the money thus obtained.

The question of whether it is better to buy an improved farm or an unimproved farm is one on which there is a variety of opinions, chiefly, perhaps, because the answer must be dependent on the conditions. Frequently a farm can be obtained for less than the original cost of the improvements; but it does not follow that the purchase would be a good investment. A second-hand suit of clothes can be purchased for much less than a new suit. Many industrial corporations have abandoned their equipment and purchased new several times during their evolution. Railroads have rebuilt their roadways, and made junk of their engines and cars, which originally cost them many thousand dollars, because better roadways

and stronger engines and larger cars were needed. The value of the improvements and equipment of railways or of industrial corporations, or of farms, bears no necessary relation to their original cost, but is dependent on their present or prospective earning capacity, and principally on the former.

If the improvements are adapted to the kind of farming to be pursued, and are in good repair, it may, perhaps usually will, be wise to purchase a highly improved farm. If, however, the improvements are not suited to the kind and method of farming, or if they have reached a condition requiring constant expense for repairs, there is danger of paying too high a price for the farm. Two classes of land are likely to be prized beyond their value,—the one which has no improvements upon it whatever, and the one with extensive improvements. A farm with only moderate improvements, and yet sufficient for the conduct of the farm, usually is the best investment.

In selecting a farm, not only should the house, as adapted to the needs of the farm, and the other buildings, as adapted to the size of the farm and the kind of farming, be considered; but also the location of these buildings, as related one to another, and their location, as a whole, with reference to the farm. The character, condition and arrangement of the fences must also be considered.

TIMBER, ORCHARDS, VINEYARDS

For the first and only time, the census of 1880 published data showing the acreage devoted to sev-

eral purposes. In that year the average size of the farms in the United States was 133.7 acres. Of this amount, 56 acres were tilled land, including fallow and grass in rotation, whether pasture or meadow. There were 15 acres in permanent meadows, permanent pasture, orchards and vineyards; 47.5 acres of woodland and forest, and 15.2 acres of unimproved land. This shows that in 1880, 35 per cent of the land in farms was in woodland. The reader will understand that this has no reference to woodlands not included in farms. According to the figures given, each quarter-section of land then contained an average of 56 acres of timber. The extent of woodlands on farms was, in South Carolina 53 per cent; in Texas 44 per cent; in Maine 41 per cent; in Massachusetts 35 per cent; in Wisconsin 31 per cent; in Ohio 25 per cent; in Iowa 11 per cent; in California 10 per cent, and in Nebraska 3 per cent.

Doubtless, the amount of woodland on farms has decreased materially in the last twenty-five years. A certain amount of wood is desirable on a farm to furnish posts, and other wood for repairs, and even possibly for fuel, in most places. For ordinary farm purposes, a farm with 5 to 10 per cent of good timber is probably worth more than land without timber.

No account is here taken of the value of wood for the purpose of sale. In those states especially adapted to the growth of trees, like the North Atlantic states, timber may be looked on as a crop to be raised with some degree of profit. In such cases

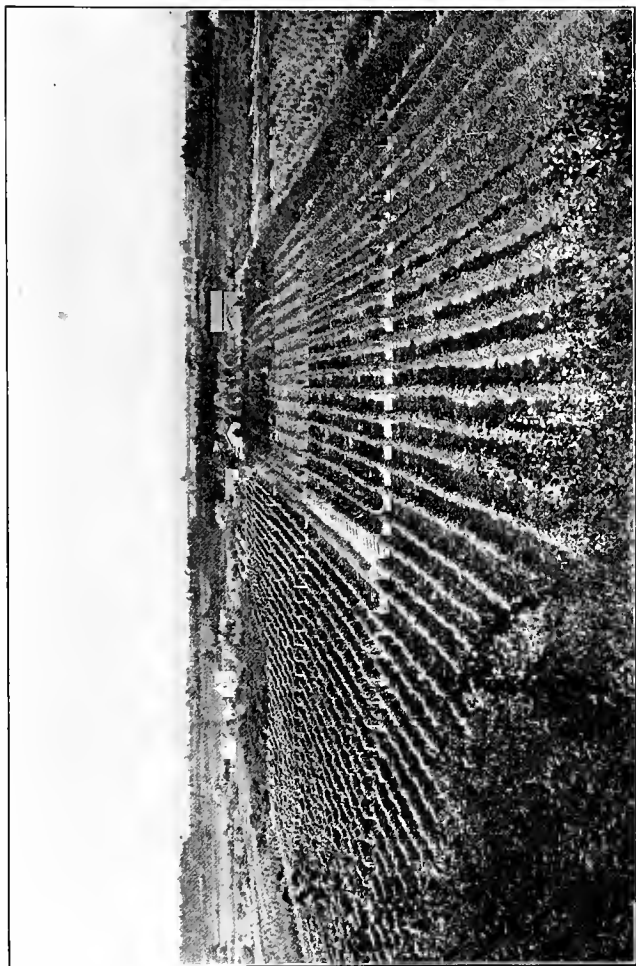


FIG. 16. Vineyard at Franklin, in southern Ontario, Canada.

the amount of woodland which is desirable will depend on the relative adaptability of the farm to forest growth.

Orchards may or may not increase the value of the farm, depending on the adaptability of the location and of the farm to orchard culture, on the character of the orchard itself, and on the general character of the farming to be followed. In some sections of the West, where orcharding is a special commercial enterprise and where quick-growing varieties, like Ben Davis, have been raised, it has been customary to count each young apple tree to be worth \$1 per acre for each year of growth up to five years; hence an orchard containing forty trees one year old would be worth \$40, and five years old, \$200. In other parts of the country, as, for example, in New York, where it is not customary to expect apples to come into full bearing until they are fifteen years of age, this method of estimating would need to be modified.

A peach-grower in central New York estimates the cost of trees at setting to be eight cents apiece; a total annual cost, for the first three years, at fifteen cents per tree, making the cost per acre for 160 peach trees, three years old, to be \$72. A vineyard costs from \$50 to \$70 per acre at the time it comes into full bearing.

CHAPTER VIII

WHEN AND HOW TO EXAMINE A FARM

SOME ONE has said that March is the best time to examine an unknown farm and August is the best time to examine known farms. This means that the best time to examine an unknown farm is when the land is being prepared for crops. At this time, it is most likely to show imperfections from the lack of drainage, or to show the effects of bad physical properties. Moreover, it does not have the attraction of the growing crop. Having a knowledge of the character of the soil, one then desires to see the crops that can be grown. In examining the farm, especially at harvest time, the character of the season must be taken into consideration. Certain classes of land grow fairly good maize when the season is just right, although in most seasons they may not do so. This is a matter that can best be learned by constant observation, and has led to the remark that one can not safely judge a farm one hundred miles from home. This remark emphasizes the danger of error, unless one has had thorough training and is a careful observer.

Very much will depend upon the character of the weather at the time just preceding the inspection of a farm. Poor land looks relatively better than good land just after or during a rain-storm. Unless one has had

wide experience and thorough training, a farm should never be selected as a result of a single inspection. It is, of course, desirable that considerable time should elapse between the inspections. Even when this is not possible, inspections should at least be made on succeeding days. It is to be assumed that the prospective buyer will, on the first inspection, be accompanied by the owner or his agent, who will conduct him over the farm in such manner and over such parts of it as are calculated to produce the best impression. It is often quite possible for certain undesirable portions to escape notice. On the second inspection, the buyer or his agent may best go alone. He should approach the farm from a different direction, if possible, and take a different route in passing over it; he should verify the sketches of the farm which he has prepared at his previous trip, and should carefully consider the possibility and cost of changes required to adapt the farm to the purpose for which it is to be purchased.

As shown in previous pages, the main features of a farm are:

(1) the character and topography of the soil; (2) the climatic conditions, including healthfulness and water-supply; (3) the location; and (4) the improvements. This chapter is intended to aid the novice in recognizing soil types and deciding their crop adaptation.

THE SOIL AUGER

In arriving at a judgment as to the character of the soil, it is always desirable to examine a section

to the depth of three feet, and, in some cases, even to greater depths. For this purpose the soil auger has been devised by the Bureau of Soils. It consists of an ordinary carpenter's $1\frac{3}{8}$ -inch auger having a worm six inches long with the screw removed. To the shank is welded a rod one-half inch in diameter, so as to make the total length of the auger forty inches. Beginning at the bottom, the auger is marked every six inches until the point of thirty-six inches has been reached. With this instrument, one is able to remove sections of the soil and subsoil to the depth of thirty-six inches. Often conditions exist in the subsoil not suspected by the character of the soil, which explains differences in crop production or crop adaptability. In the older settled regions, cuts in roadways and railroads afford opportunity for noting the general character of the subsoil to greater depths.

Having examined the farm and got in mind the general crop adaptation of the different portions, and having noted the character of the so-called native tree growth when existing, the topography of the land, the shape and size of the fields, and other items outlined in the score-card for farms, the examiner should make borings on each portion of the farm having different appearance or different crop adaptation. By discreet inquiries concerning the method of management, and by

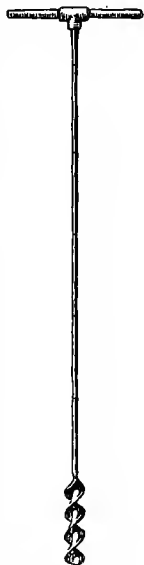


FIG. 17.
Soil auger.

observation of other farms having similar soil-types, a judgment may be reached as to what extent the crop-production is due to the character of the soil and to what extent it is due to past and present management; to what extent it could be improved by proper treatment, how difficult it may be to keep it in present condition, or how rapidly it is likely to deteriorate.

PURPOSE OF SOIL CLASSIFICATION

A soil is a mixture of organic matter, clay, silt sand and sometimes gravel or stones containing organisms, air and water in which are dissolved certain chemical compounds necessary to the growth of plants, and in which substances prejudicial to their growth may exist. By means of their roots, plants find a foothold in this mixture, and are thus enabled to be subjected to the essential factors of growth, which include heat, light, nourishment, and are also, of course, subjected to any injurious or destructive agencies which may exist. As yet, no expression of these relationships has been worked out which will satisfactorily determine the fertility of the soil or its crop adaptation. (See p. 40.)

At present, the historical method is the chief reliance in determining the crop capacity or the crop adaptation. By experience and experiment, the character of a given type of soil and the proper method of its management may be determined at a given place. If this type of soil is met with elsewhere under similar climatic conditions, it is fair to assume that it will have similar

crop value and will respond to the same treatment. The Bureau of Soils has therefore begun to survey the soils of the United States with a view to correlating and classifying them in order that the knowledge gained by farmers and by the experiment stations may be made generally applicable and intelligible.

CLASSIFICATION OF SOILS

The soils of the United States have been divided into a number of soil provinces, among which the following are the most important:

Glaciated, or Glacial Lake.

Coastal Plain.

Piedmont Plateau.

Residual Limestone Valley and Upland.

Appalachian Mountain.

Flood Plains of the Mississippi and its larger tributaries.

Residual Soils of the Prairie Region.

High Plains Area.

Sierran, or Soils of the Far West.

This classification is based partly on geographical considerations, but the origin of the soils and the climatic conditions enter largely. The map of soil provinces on the next page was specially prepared by Dr. Jay A. Bonsteel for this book, and is believed to embody the latest information upon this subject. A discussion of these soil provinces by Dr. Bonsteel follows:

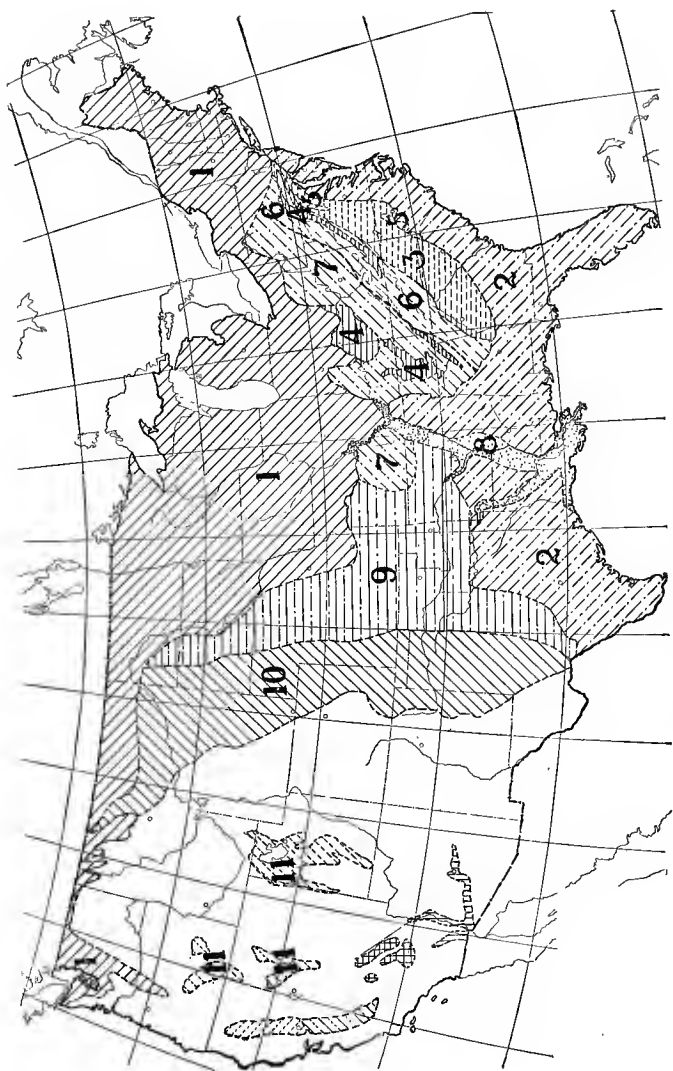


Fig. 18. Soil map of the United States.

"No. 1 constitutes the glaciated and glacial lake region of the United States. The soils within this province are not usually derived solely from the underlying rock formation, but are formed from extraneous materials brought in primarily by the action of the great continental glacier, and either deposited as terminal moraines, as till sheet, or else reworked by flowing waters and deposited as high river terraces or lake sediments. Within this province there are several dominant soil series. Throughout the wheat belt of the Northwest and in the western portion of the corn belt the Marshall series predominates. In the central prairie states and further eastward the Miami series is most widely developed. These two series consist of glacial material, either as it was first formed or else as it since has been reworked by water or wind action. Both series include at the present time some loessial material. In this general region also are found the Superior series of northern Wisconsin and Minnesota, the Clyde series of the lower peninsula of Michigan, the Dunkirk series in northern Ohio, Pennsylvania and western New York, and the Vergennes series of the Champlain Valley, all of which are glacial lake series.

"In the coastal plain province, No. 2, the soils are derived from marine sediments of recent date, chiefly unconsolidated, although the Cretaceous prairie region of Texas and Alabama contains considerable areas of solid limestone. Otherwise, the materials from which the soils are derived consist of unconsolidated clays, loams, sands and gravels. Within the coastal plain region occur the Galveston series along the shore-line,

the Portsmouth series in low-lying, poorly drained areas immediately back from the coast, the Norfolk series throughout almost the entire extent of the region, the Orangeburg series chiefly in the South Atlantic states, and the Houston series in the Cretaceous prairie belt.

"The region numbered 3 is known as the Piedmont Plateau. Within this general region the soils are all derived from the processes of weathering, from the solid and usually crystalline rocks which underlie them. One great dominant series is found in the Piedmont. This is the Cecil series. In addition, the Iredell series and the Merion series have been outlined by recent work of the Bureau of Soils.

"The fourth great division of the United States consists of the massive limestone areas numbered 4 on the map. Not all of the areas in which this limestone occurs, with its derived soils, can be indicated upon a map of such small scale. Throughout these regions a thick-bedded, pure calcium carbonate limestone has been subjected to long periods of solution, and the small percentage of impurity present in considerable thickness of lime rock has accumulated to form the soils of this Cambrian-Silurian period. The soils thus formed are included in the Hagerstown series. They constitute rich 'blue-grass' lands.

"The small areas numbered 5 represent the red and green shales and sandstones of the Newark formation. The soils derived from this formation are known as the Penn series. They are not of wide distribution, but are thoroughly characteristic in the region where they occur.

"The region numbered 6 constitutes the Appalachian Mountain belt, which is chiefly forested and non-agricultural. Considerable areas are cultivated, however, especially in the mountain valleys. With the exception of the Blue Ridge Mountains and the Catoctins, both of which contain considerable areas of crystalline igneous rocks, the Alleghany Mountain belt is covered by soils which are derived from sandstones and shales, chiefly of the Paleozoic age, DeKalb and Upshur series. The soils are apt to be thin, sandy and stony, and the topography is not conducive to any extended agricultural occupation of the region.

"The areas numbered 7 constitute a plateau development of these same Paleozoic rocks, with the addition, in the western areas of Kentucky, Tennessee and Missouri, of considerable deposits of carboniferous limestone. This particular limestone gives rise to the Clarksville series of soils, well known in western Tennessee and Kentucky for the production of general farm crops and tobacco, and equally well known in southern Missouri and northern Arkansas for the production of the Ben Davis apple and of peaches. The eastern part of this region, next to the Alleghany Mountains, is occupied by the DeKalb series, which also occurs in the mountain belt. The DeKalb series constitutes soils of rather low value for general agriculture, but well adapted, particularly in the southern regions, to the production of the Elberta peach.

"The region numbered 8 comprises the great flood

plains of the Mississippi River and its major tributaries. It is impossible on a map of this scale to show the northward extension of these alluvial lands much beyond the confluence of the Ohio and the Mississippi. The Yazoo series of alluvial soils is most prominent in this region. The Red River, however, has formed a soil series known as the Miller series. Where these lands are not subject to unusual overflow they constitute cotton and corn soils of remarkably lasting fertility.

The region marked 9 is difficult to define, beyond the statement that it constitutes the humid western plains, through which the soils are chiefly residual and derived from a variety of sedimentary rocks. The Sedgwick series of Kansas and Nebraska and the Vernon series of Texas and Oklahoma constitute two well-marked classes of soils.

"It should be held in mind, in the consideration of the central states on both sides of the Mississippi River, that all these provinces as outlined on the map have locally been subjected to modification by the deposition of considerable thicknesses of fine silty material known as loess. This material in general constitutes narrow belts of upland along the alluvial bottoms of the major streams. In the southern states,—Kentucky, Tennessee, Mississippi, Arkansas and Louisiana,—the Memphis silt loam is the most important type derived from this silt. Farther north the Marshall silt loam and Miami silt loam are both formed from different phases of this silty over-burden. Not enough work has been done as yet to outline completely this loess region. When this is possible, it will be thrown into a single soil province.

"The region marked 10 constitutes the high plains, or the semi-arid plains. The soils are chiefly residual, and in ordinary years the rainfall varies from eight to twenty inches. This region is marked by an upland prairie suitable for grazing purposes and for the production of certain drought-resistant crops, like durum wheat. It is not adapted to general farming without irrigation, and the water-supply available for that purpose is decidedly limited. Throughout this belt, however, the larger streams from the Rocky Mountains are bordered by narrow strips of river terrace and alluvial land, upon which water can be led from dams constructed higher up the stream. The lower Arkansas Valley sugar-beet and potato region, the Greeley, Colorado, region, and the irrigated districts along the Yellowstone River lie within this belt.

"Westward from this belt occurs what might be termed the Sierran province of the United States. It is marked by the high Cordilleran range of the Rockies, the various Sierras, and the Coast and Cascade ranges. Included within this mountainous district are considerable basins and extensive river valleys which comprise practically all of the agricultural land, if we except the basaltic plateau of Montana, Idaho and Washington, frequently called the Palouse region. Each one of these basins constitutes a little soil province by itself, so that it is impossible to generalize this portion of the map. It should be held in mind that of 835,000,000 acres west of the 100th meridian not over 60,000,000 acres are under cultivation, and that, if every drop of available water were used, the area

under cultivation could scarcely be doubled. The largest single area which can be grouped together is formed by the interior basin regions marked 11 on the map. These areas were formed as great freshwater, inland seas, probably at the time when the northern part of the United States was heavily glaciated. Since that time these lakes have dried up and the lake deposits have come to constitute soils. Three series are known thus far,—the Jordan series, which occupies low-lying, recent alluvial plains around the remaining lakes; the Salt Lake series, formed from the old bench lands,—that is, Pleistocene deposits formed when the lake stood at a higher level; and the Bingham series, consisting of talus slopes and colluvial wash carried down by torrential streams from the surrounding mountains. These lands are capable of cultivation where they can be irrigated, but in many cases adequate drainage must be provided in order to prevent the accumulation of alkali salts.

"The great interior valley of California has been subdivided on this map into two small regions. The valley itself consists chiefly of marine and lacustrine sediments, and a variety of soils, included in several soil series, has been mapped. The southern, or San Joaquin Valley, is marked by increasing aridity from Sacramento southward, while the Sacramento Valley is marked by increased humidity from Sacramento northward. The San Joaquin Valley constitutes non-irrigated wheat, general farming and fruit lands.

"It has been impossible, on the scale of map used, to attempt the delineation of the cultivated valley areas along the Pacific coast. The agricultural lands lie in small groups or aggregations bordering the sea and backed by the mountains. The regions around San Diego, Santa Ana, Los Angeles and Ventura, in Santa Barbara county, along the Salinas Valley, in San José Valley, and in other smaller valleys farther north are all well-known fruit-producing areas. They are marked by a great variety of soils,—as great as any portion of the United States. Each region constitutes a little physiographic soil province by itself, and no particular general classification of these lands can be made.

"The great interior basin along the lower stretches of the Colorado, along the Gila, and in San Diego and Riverside counties, California, constitute the overflow or delta lands of the Colorado River and its tributaries. This region is essentially arid. It is not a citrous fruit belt, and its development is occurring along the lines of general farming and stock-raising under arid conditions. The Imperial series of soils dominates this region, although other types are present. It is distinctively an irrigation country, presenting the largest single cultivated area in the United States where the rainfall is under seven inches per annum.

"The Death Valley and Mojave Valley regions have been indicated on the map. They are non-agricultural under any present conditions. They are simply placed there to indicate interior basins, partially or entirely below sea-level, where rain occurs so seldom that it may almost be said never to reach the ground."

SOIL SERIES

The soils within a province are next divided into series, of which thirty-one have already been recognized. The chief factor in determining a series is the geological origin of the soil,—whether glacial, residual, alluvial or lake deposit. Although exceptions have been made, in general, a series name is not carried over from one province to another. Each series of soil is divided into a number of soil types depending principally upon the physical properties of soil and subsoil viewed in the field, but not neglecting the observed crop growth and plant adaptation. The soil and subsoil of these types are then subjected to mechanical analysis in the laboratory as a check on the field-observer's judgment. In making a mechanical analysis, all particles more than two millimeters in diameter are rejected, and the remaining fine earth is divided into particles of the following diameters:—

TABLE SHOWING SIZE OF SOIL PARTICLES IN MECHANICAL ANALYSIS

		Diameter in millimeters.
I.	{ Fine gravel	2-1
	{ Coarse sand	1-0.5
	{ Medium sand	0.5-0.25
II.	{ Fine sand	0.25-0.10
	{ Very fine sand	0.10-0.05
III.	Silt	0.05-0.005
IV.	Clay	0.005-0

The names given to the particles of different size are purely arbitrary, relate to size only, and have no

relation to the chemical composition of the particles. For ordinary purposes, the classification may be based upon subdivisions into four groups of sizes, as indicated in the table above and which will be referred to as coarse sand, fine sand, silt and clay. When sand only is mentioned, both coarse and fine sand are included.

All soil types are either sandy soils, loam soils, clay soils, or some gradation between these, as sandy loam, silt loam, clay loam, etc. The soils are further subdivided, by the occurrence of particles larger than two millimeters in diameter, into gravelly or stony soils. The difference between a gravelly and a stony soil is not clearly defined; although in general a stony soil is distinguished from a gravelly soil by the greater proportion of larger and less rounded pieces of rock. The Bureau of Soils has proposed a scheme of soil classification based upon the mechanical composition of soils.¹ According to this classification, a sandy soil contains less than 10 per cent of clay and less than 20 per cent of silt and clay. A loam soil contains 15 to 25 per cent of clay and more than 50 per cent of silt and clay. A clay soil contains more than 35 per cent of clay and more than 60 per cent of silt and clay. Sandy soils are further subdivided, depending upon the relative proportion of sand particles of different sizes, into coarse sand, sandy and fine sand soils. Three types between fine sand soils and loam soils have been recognized, viz., coarse sandy, sandy loam and fine sandy loam; and two types between loam soils and clay soils, viz., silt loam and clay loam.

¹ U. S. Dept. of Agr., Bu. of Soils, Instructions to Field Parties and Descriptions of Soil Types. Field Season, 1904, p. 20.

HOW SOILS ARE NAMED

Soils are named by giving to each soil a series name, as Miami, Norfolk, Cecil or Marshall, and following this by a type name, such as loam, sandy loam, silt loam, clay loam, or clay. Up to 1904, thirty-one soil series had been adopted. The following eleven type names have been recognized, one or more of which may occur in each series: (1) stony loam, (2) gravel, (3) gravelly loam, (4) sand, (5) fine sand, (6) sandy loam, (7) fine sandy loam, (8) loam, (9) silt loam, (10) clay loam, (11) clay. Thus far, in no series have all the types been recognized, although new types are constantly being added.

Two series, the Norfolk, of sedimentary origin, in the coastal plain province, and the Marshall, of glacial origin, in the glacial and glaciated lake province, will illustrate this soil classification:—

TABLE ILLUSTRATING METHOD OF NOMENCLATURE OF SOILS

NORFOLK SERIES							
Name	Mechanical analysis of soil				Area mapped up to 1904 (acres)	Crop adaptation	
	Coarse sand	Fine sand	Silt	Clay			
Norfolk gravel . .	—	—	—	—	. 138,670 .	Unproductive; should remain in forest.	
Norfolk gravelly loam .	27	38	25	8 .	. 65,734 .	Unproductive; used for cereals, buck-wheat, truck crops, wrapper tobacco.	
Norfolk coarse sand . .	56	28	10	4 . .	. 128,066 .	Very unproductive; used for tobacco, peaches and truck.	
Norfolk coarse sandy loam . . .	44	23	24	9 .	. 92,800 .	Unproductive.	
Norfolk sand .	32	52	11	4	994,292	Excellent for tobacco and watermelons.	

TABLE ILLUSTRATING METHOD OF NOMENCLATURE OF SOILS

NORFOLK SERIES, CONTINUED

Name	Mechanical analysis of soil					Area mapped up to 1904 (acres)	Crop adaptation
	Coarse sand	Fine sand	Silt	Clay			
Norfolk fine sand . .	13	66	13	6	. .	140,604	Similar to Norfolk sand, but generally more productive.
Norfolk sandy loam . .	29	48	16	6	. .	474,732	Sweet and Irish potatoes, peanuts, late truck crops, cotton, tobacco.
Norfolk fine sandy loam	12	53	26	8	. .	528,132	Late truck crops, cotton, tobacco.
Norfolk loam . . .	16	40	31	11	. .	345,166	Sweet maize, peas, tomatoes, peaches.
Norfolk silt loam . . .	14	24	47	13	. .	458,238	Unexcelled for general farm crops; excellent for dairy farming.

MARSHALL SERIES

Marshall stony loam . .	16	36	34	14		38,464	Used mainly for grazing.
Marshall gravel . . .	50	27	15	7		22,288	Unproductive; early grazing.
Marshall gravelly loam	23	28	32	17	. .	54,784	Unproductive.
Marshall sand . . .	38	41	11	10	. .	1,024	Yields uncertain; well adapted to vegetables and melons.
Marshall fine sand . .	13	76	5	6	. .	13,376	Early truck crops; melons, Irish potatoes, clover seed.
Marshall sandy loam .	27	38	26	9	. .	97,856	Good general farming.
Marshall loam . . .	11	30	41	17		1,009,408	Above average for general farming; wheat, oats, maize, barley and flax principal crops.
Marshall silt loam . . .	3	12	69	16	. .	1,813,888	Excellent for wheat, maize, oats, alfalfa, tobacco, sugar-beets.
Marshall clay loam . .	9	19	41	30	. .	75,840	General farming; ideal for maize and hay; good for fruit, vegetables and for grazing.

One can learn to recognize the difference between a sandy or clay soil, and the intermediate types only by experience in connection with some one competent to point out the different types. Since practically every conceivable gradation between sand and clay exists and many slight variations or phases of a given type may exist, it is often very difficult for even an expert to classify the soils of a farm or a region accurately. In the following chapters, the types of soil present in the geographical regions of the United States will be mentioned, and their adaptability to crop production discussed, so far as space will permit.

CHAPTER IX

JUDGING THE FARM

A SCORE-CARD for animals, plants or farms is likely to be misleading, hence a hindrance, unless used with judgment. Such a card serves to call attention to the chief points to be considered, in order that none shall be overlooked, and in order that the proper relative importance may be given to each.

A man once planned a home without the aid of an architect, and gave the contract to a builder with the remark that he did not want any advice concerning the plan, nor any suggestions with regard to alterations. When the house was finished he found that he had forgotten the stairs leading to the second floor. With the score-card in hand, one may be prevented from overlooking such things as the character of the water-supply, the location of the farmstead with reference to the farm as a whole, or the character of the roadway between the farm and market.

Score-cards contain certain inconsistencies. In a score-card for cattle, only a few points are given to the head, yet without a head, or even with an extremely poor head, the animal would scarcely be used for breeding purposes. In the score-card proposed below, only five points are given to healthfulness; yet, theoretically, if the locality was extremely dangerous

to health, the farm would have no value. Likewise, if it were not possible to secure any water, the farm would be useless. We are not dealing with idealism, however, but with the influence of these factors in commercial life. The purpose of this score-card is to enable one to arrive at the commercial value of the farm. The question is, then, not whether water-supply is necessary or not, or healthfulness pre-eminently desirable, but to what extent do these factors enter into the relative economic value of farms actually?

As the locality and character of the farming will modify the relative importance of these factors, the values given in the score-card are supposed to apply to the North Atlantic and North Central states where general or mixed farming is practiced. From this point of view, then, it is assumed that one-fifth of the commercial value of the farm will depend on its fertility, one-fifth on its location, and 17 per cent on its improvements. In other words, it is assumed that the fertility and physical properties of the soil, the location and improvements constitute, on an average, 61 per cent of the commercial value of a farm. To put it in still other words, if one pays more than 20 per cent of the value of the farm on account of location, one is likely to pay more than its economic value. If the improvements constitute 50 per cent instead of 17 per cent of the total value of the farm, these improvements may be worth it, and one may pay it for the home value; but one can scarcely expect the extra improvement

to earn interest upon the investment, unless the improvements are for some special kind of farming.

After all, no standard applicable to all conditions and kinds of farming can be proposed. The score-card is proposed for its educational rather than for its intrinsic value. If any one follows it blindly, it will be a case of the blind leading the blind.

At the close of this chapter is the score of two farms located in central New York. This score is preceded by a discussion of the reasons for the judgments indicated. It is assumed that the chief income will be from the sale of butter-fat to a creamery two miles distant; although this does not preclude the possibility of other sources of income, such as from the sale of wheat, potatoes, wool and mutton. To these purposes, both farms were well adapted. The Mitchell farm contains 108 acres, and the McGowan farm 125 acres. About fifty acres of the former and seventy-five acres of the latter are arable. In the opinion of the author, these farms are too small for the purposes for which they are to be used at the prevailing prices for butter-fat and other cash products in central New York. The gross income would not be large enough to bring sufficient net income. A gross income is an essential condition of a net income.

The Mitchell farm is nearly square, with the buildings in one corner, while the McGowan farm is L-shaped, with the buildings at the end of the longer branch of the L. The topography of both is somewhat irregular, affecting yields, ease of cultivation and erosion. The soil of the McGowan farm, while it is of the same general type as that of the Mitchell farm, is of

slightly more loamy character, due to a larger proportion of organic matter, and perhaps to a rather larger proportion of sand, or silt, or both. It already contains a considerable quantity of tile drain, although in one or two places more is obviously needed, while the Mitchell farm is much in need of thorough under-drainage. The timber on the McGowan farm has recently been sold, and a number of acres of land needs to have stumps removed; while fifteen acres should be left to grow up to timber again.

The climate of central New York is rather severe, making shelter necessary a large number of days in the year, and reducing the number of days that farm labor can be performed, thus increasing the amount of help required. In the kind of farming proposed, the effect of these drawbacks is reduced to a minimum.

On the McGowan farm there is an excellent stream, and the artificial water-supply is ideal, while small springs exist on the Mitchell farm, and the artificial water-supply is at present deficient; although it could doubtless be made perfect by driving or drilling a well one hundred to one hundred and fifty feet deep.

These farms have equal advantages as to location since the farmsteads are opposite each other on the same road. The local market is not ideal, either from the standpoint of purchasing supplies or selling produce. The neighborhood is not as desirable for a dairy farm as some others, because it is not a dairying center; consequently a steady market for dairy products is not assured.

The roadway to and from market, school and church

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is unimproved; and between the market and the farm is one rather steep hill, the middle of which is boggy, greatly reducing the hauling capacity of the roadway. Fortunately, however, it is down grade to market. On this roadway, the snow drifts badly.

The farmsteads on both farms are located where they should be, so far as these farms are concerned, but the farms are such as not to make the location ideal. Both houses are rather larger than is needed, while the outbuildings of the Mitchell farm are less adapted and less adaptable to dairy farming than those of the McGowan farm. The latter is well fenced, and the fences are in good repair. The former is only partially fenced and much of the fence is old and needs to be rebuilt.

The Mitchell farm has practically no orchard, but has twelve acres of excellent timber, from which a not inconsiderable amount of lumber, posts and wood may be harvested annually. The McGowan farm has three acres of excellent orchard, but this is more than offset by the fact that the timber is now only a clearing and years must elapse before further lumber can be harvested.

The two farms have been scored, in light of the facts stated, in order to give the reader an idea of the method of using the score-card, but more especially in order to emphasize the relative importance of the different factors involved in the purchase of a farm. While the novice will, it is believed, find such an outline helpful in making his selection, it is intended rather as a means of instruction and as an aid, than as a formal

method of judging farms. In using the score-card, the points deficient are marked. In order to compare each farm with 100 as a standard, subtract the total points deficient from 100.

CORNELL UNIVERSITY—DEPARTMENT OF AGRONOMY				
STUDENT'S SCORE-CARD ECONOMIC VALUE OF FARM		Standard	Mitchell farm	McGowan farm
<i>Kind of Farming—</i>		Points Deficient		
1. Adaptation as affecting value	} 3			
Proportion				
<i>Size—</i>				
2. As adapted to kind of farming to be pursued	2	1.0	0.5	
<i>Shape—</i>				
3. As affecting shape of fields	2			
4. As affecting nearness to farmstead . . .	3			1.0
<i>Topography—</i>				
5. As affecting production	1	0.5	0.3	
6. As affecting ease of cultivation	3	1.0	0.5	
7. As affecting loss of soil fertility	2	0.5	0.3	
<i>Fertility—</i>				
8. Natural	15	7.0	5.0	
9. Condition	5	3.0	1.0	
<i>Physical Properties—</i>				
10. As affecting economy of cultivation . .	1	0.5	0.3	
11. As affecting number of days' labor . .	1	1.0	0.2	
12. As affecting loss of soil fertility	2	0.5		
<i>Drainage—</i>				
13. Natural	} 5	3.0	1.0	
Artificial according to its need				
<i>Condition—</i>				
14. Freedom from stumps, stones, weeds, waste land, etc.	3	0.5	1.0	

CORNELL UNIVERSITY—DEPARTMENT OF AGRONOMY

STUDENT'S SCORE-CARD
ECONOMIC VALUE OF FARM

Standard	Mitchell farm	McGowan farm
Points Deficient		

Climate—

15. As affecting production and cost of raising live stock	3	1.0	1.0
16. As affecting number of days of labor . .	2	1.0	1.0

Healthfulness—

17. As an economic factor	5		
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Water-supply—

18. Running water	} 5	1.0	
Wells			

Location—

19. Local markets for purchase and sale . .	5	1.0	1.0
20. Neighbors as an economic factor . . .	5	2.0	2.0
21. Shipping facilities	5	1.0	1.0
22. Roadways	5	2.0	2.0

Improvements—

23. Location of farmstead	3	0.5	1.0
24. House as adapted to needs of farm . .	5	0.5	0.5
25. Other buildings as adapted to size of farm and kind of farm	5	2.0	1.5
26. Fences, character, condition and arrangement	2	1.5	0.5
27. Timber, orchards, vineyards, etc. . . .	2		1.0
Total points deficient		31.5	23.6

CHAPTER X

SOME FACTORS IN FARM MANAGEMENT

HAVING found a farm that appears to satisfy the requirements, a plan of operation covering from three to five years should be worked out, and careful conservative estimates made of the probable receipts and disbursements. The average yields of all staple crops have been estimated year by year, for many years, for every state, by the United States Department of Agriculture, and the average December farm price of these commodities is annually estimated by states. The average price of live stock and of their products in the principal markets is also given. These estimates and statistics are published annually in the year-book of the Department, and are available through the national senators and representatives to all citizens. Taking these figures as a basis, judgment must then be exercised as to the probable deviation from average yields that can be obtained on the farm in question under the management proposed. This requires experience and rare good judgment.

In making these estimates, a clear distinction must be made between possible yields and those that it is safe to do business on. In no case should single instances of unusual yields be made a basis for estimates. These are excellent ideals to strive for ; but

if used as a source of profit hoped for, they are likely to lead to the sheriff. On the other hand, unless one can feel assured of getting better returns than the average, no profit can be expected and the farm should not be purchased. In a very general way, it may be estimated that good management can be safely depended upon to yield 50 per cent more than state averages; while to double the yield is an ideal reasonably to be striven for, but never used in making estimates of profit and loss. To this is to be added or subtracted the relative crop-producing power of the farm compared with an average. Unless a special market is to be had, the average December farm price for a period of ten years may be used in estimating values.

In order to aid in working out such a problem, in farm management, an entirely theoretical farm has been assumed, its methods of management outlined, the probable receipts and disbursements, the farm income and the labor income estimated. In actual practice, it is not probable that all the conditions named would exist on a single farm of the size given, although all are plainly possible. These conditions have been assumed in order to make the problem applicable to as many farms as possible. Most farms, therefore, of the general character described, would produce a less income per acre than the one outlined in the next chapter. For illustrations of returns from actual farms, the reader is referred to page 125.

Two forms of statement in working out the farm problem are possible:

1. Charge the labor of the farmer to the farm, and calculate the per cent of interest obtained on the investment.

2. Deduct a fixed per cent of interest on the capital invested from the net farm income, and consider the balance the income or wages of the farmer.

The former is the usual method of calculating farm profit, and is practically universal in other businesses where the main question is the dividends to be declared on the stock.

To persons looking forward to the possibility of owning and living on a farm, the important economic question is, what sort of compensation can be obtained for their intelligence, energy and labor; how will it compare with a salaried position, all other things considered? Will they, after paying the usual rate of interest on capital invested, have a fair return for their labor? For this purpose, the second method is the better, and is the one we shall follow, since the normal farm enterprise is from the standpoint of the man who lives on the farm, be he owner or tenant.

THE FARMER'S CAPITAL

When a farmer deducts his disbursements, or expenses of operating the farm, from the amount received from his sales, he has his cash balance. This does not represent his real farm income, since his farm property may be more or less valuable than at the same period on the preceding year. In order to know

whether he is making or losing money he must, therefore, like any other business man, take each year an inventory of his property, and add the increase in value, or subtract the decrease from the cash balance to find the farm income. This farm income has been due to two causes: the capital employed, and the farmer's own labor and foresight. To determine how much of the income he is to receive for his labor, interest must be calculated on the capital employed and deducted from the farm income.

It is essential to see clearly on what interest is to be charged, in order to understand the financial aspects of a problem in farm management. Man's capital may be defined as the means he has of carrying on his business. The following outline shows the way the farmer's capital may be divided:

Farmer's Capital . .	{	The Plant	{ Farm Buildings Fences Tools Teams Animals
		Materials	{ Seeds Fertilizers Food Animals
		Supplies	{ Food Money

The farmer's capital, like the manufacturer's capital, may be divided into three parts, viz., the plant, the materials, and the supplies. These divisions are

not sharply defined; yet they have a value, especially in enabling one to compare the financial possibilities of different kinds of farming.

In a factory, the tools and machinery used in the manufacture of the articles to be sold, all necessary buildings, and the grounds necessary for the buildings and the carrying on the business of the factory, make the plant. On the farm, the plant consists of the farm itself, fences, buildings, machinery and tools. The plant, also, includes all animals used for labor or from which products are sold. Therefore, all work-horses, milch-cows, sheep kept for the production of wool, or animals kept for breeding purposes are a part of the plant.

The materials are those things which are incorporated into the finished product. In a cotton factory, the raw cotton and the dyes used in making the cloth are materials. In a canning factory, the tomatoes and the cans are materials. On the farm, seeds, fertilizers, animals which are to be sold, and food which is to be fed to animals which are to be sold or whose products are to be sold, are materials. Substances which are used up in the manufacture of raw materials, although not themselves incorporated into the finished products, are materials. The oil and acid used in a cotton factory are materials. On the farm, straw used for bedding live stock may be considered materials. Animals used for labor, for breeding purposes, for the production of milk or wool or other products may at any time be sold, when they may be looked upon as materials, since they then become

finished products. Sheep kept both for wool and for mutton may be difficult to classify, but should be placed under materials if kept chiefly for the production of mutton; and should be placed under the plant if kept chiefly for the production of wool or lambs.

Every business man must have supplies, or their equivalent in money, upon which to live until he receives returns from his enterprise. If he is the manufacturer of plows, these supplies must last while he turns the iron into plows, and until sales have been made and money collected. The laborers must also have supplies on which they and their families can live, or they must be paid money for this purpose. In other words, the manufacturer must have not only the plant and the raw materials, but he must have also a surplus of money out of which to pay workmen and out of which he himself may be supported. Supplies on the farm consist in money to pay for labor, to support the farmer and his family, and food, or the money to buy food, for his teams.

The amount of capital to be invested in supplies will depend on the character of the business, and has a marked influence in deciding the character of the farming. The man who starts out to make a specialty of breeding horses may need to have capital for supplies to cover three to six years; in case of apples, from five to fifteen years. For this reason, horse-breeding or apple-raising is rarely engaged in as an exclusive business,—at least, not at the start. The man who makes butter may need to have capital only for a week's or at most a month's supplies. If he sells milk, he will need

capital for only a day's supplies. Inasmuch as the laborer and the grocer are willing to extend at least twenty-four hours' credit, he requires practically no capital for supplies.

One reason for the great popularity of our cereal crops in the North, and of cotton and tobacco in the South, is their quick return.

Oats are popular with the northern tenant farmer, since they can be sown in April and sold in August. A farmer was heard to remark that buckwheat was the only crop for which he could buy commercial fertilizers on a ninety-day note and pay the note out of the crop produced. In southern Illinois, orcharding was developed largely by the capital of lawyers, doctors, ministers and business men in the adjacent towns, because they could wait for returns without interfering with their other business; while the farmer could not give up his land to orchards without decreasing his returns from other crops necessary to support himself and family. Dairying and poultry raising give quick returns, as compared with the raising of beef, mutton and wool, and is a reason for their general popularity. The production of swine requires small capital for the plant, and gives quick returns; hence, it is popular when cheap concentrated food exists.

INFLUENCE OF NATURAL AND ARTIFICIAL CONDITIONS

Broadly speaking, profit in farming depends upon natural and artificial conditions. Wise farm management consists in adapting the farming to these conditions,

and in leading in necessary changes when the conditions change. One should not try to raise wool on fertile river-bottoms, nor maize on hill tops.

In a certain county in Ohio, there are two creameries, about ten miles apart. Both plants were built by the same constructing firm, doubtless under somewhat similar conditions. The Sunbury creamery has proved a success; the Lewis Center creamery, a failure. Doubtless there are other reasons for the success and failure, but the one that follows is so obvious that any one who runs may read.

The Sunbury region is hilly, naturally well drained, supports good Kentucky blue grass; but the soil is thin, and relatively ill adapted to the growth of cultivated crops. Manure and fertilizers are absolutely essential to continued profitable cultivation. In the Lewis Center region, the land is more level. It is much improved by tile drainage. The soil is not especially adapted to Kentucky blue grass; but the region is excellent for the production of hay and grain. As yet, fertilizers are not so essential to profitable cultivation. In the one region, a large number of the farmers were dairymen from necessity before the creamery was established; in the other, they were hay- and grain-producers from choice. Doubtless the people in the Lewis Center region could be educated in time to support a creamery and make it profitable. The fact remains, however, that for purely natural causes the Lewis Center creamery was of much less advantage to its patrons than was the Sunbury creamery, leading to failure in one case and success in the other.

Farming, as a business, is peculiar in being much more dependent upon natural causes than is any of the other great industries. This scarce needs any proof, but the fluctuations in the yield of the great cereals, due mainly to variations in climatic conditions, well illustrate the dependence of farming upon natural causes. The following table gives the yield of wheat, maize and oats in million bushels for the years indicated:—

YIELD OF THREE STAPLE CROPS FOR SEVENTEEN SUCCESSIVE YEARS

Year	Wheat	Maize	Oats	Total
1889	491	2,113	752	3,356
1890	399	1,490	524	2,413
1891	611	2,060	738	3,409
1892	516	1,628	661	2,805
1893	396	1,620	639	2,655
1894	460	1,213	662	2,335
1895	467	2,151	824	3,442
1896	428	2,284	707	3,419
1897	530	1,903	698	3,131
1898	675	1,924	731	3,330
1899	547	2,078	796	3,421
1900	522	2,105	809	3,436
1901	748	1,522	736	3,006
1902	670	2,523	987	4,180
1903	637	2,244	784	3,665
1904	552	2,467	895	3,914
1905	693	2,708	953	4,354

It is obvious that the marked fluctuations observed in different years are due to natural causes. The same farmers tilled the same soil in the same way each year, as far as natural causes would allow them to do so; yet in 1900 there were produced 2,105,000,000 bushels

of maize, in 1901 less than three-fourths that amount; while in 1902, 1,000,000,000 bushels more were produced than in the previous year. A variation of 100,000,000 bushels of wheat in succeeding years, due to climatic

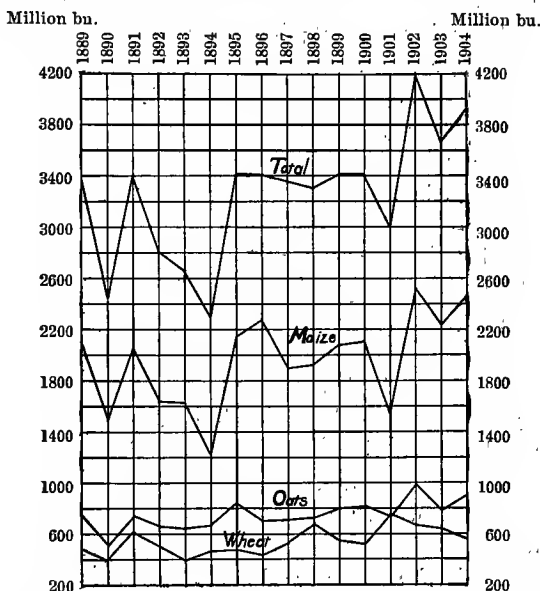


FIG. 19. Influence of season upon yield of cereals in the United States.

conditions, is not at all uncommon. These broad facts are controlling factors in farming, as well as of the profoundest significance in the world of economics.

Let it be supposed that the manufacturer of shoes, using the same factory and the same materials and employing the same labor, produced one year 400,000 pairs of shoes, the next year 600,000 pairs, the next

500,000 pairs, and perhaps the next year 400,000 pairs of shoes, and a condition approximating that common in farming would exist. If manufacturing were done under any such conditions, there would be a great change from present methods. The manufacturer not only controls his output; he has much greater control over cost of production, since capital and labor can, in most instances, be regularly employed. When it rains, he has a roof over his workman and the work is not interrupted; when it grows dark he can turn on the lights, and still the work continues; if it gets cold, he has fires, and the men are comfortable. Thus knowing the number of working days in the year, he knows how many hours he can work each year. It is not so in agriculture. A few years ago in a certain locality there were twenty-one days of rain in the thirty-one days of May. The next year, between the fifth day of June and the fifth day of September in the same locality, there was not one-half an inch of rainfall at any one time. There is thus a great variation in the working efficiency of men employed in agriculture.

It is much the same in the use of farm machinery. One man, by the use of the shoe-pegging machine, can in one year peg many thousands of shoes. The first cost of the machine may be large; but the manufacturer can use it eight hours a day, or, if need be, twenty-four hours a day every working day in the year; and thus the capital employed for the amount of work done is not great. On the other hand, the average farmer with \$125 invested in a self-

binder does not use it more than six days in the year.

While natural causes, therefore, prevent the farmer from using the same business methods, and from being able to calculate his profits with the same precision as is possible by those following manufacturing and mercantile pursuits, it is, nevertheless, important that farming should be planned to avoid, as far as possible, the influence of natural causes. Certain kinds of farming are less dependent on natural causes than are others. Wisdom and foresight can do much to avoid, in all farming, untoward influences. The good farmer seldom complains about the weather.

There are artificial conditions which control the profit in farming as well as the kind of farming. The sale of produce depends upon distance from market or from the shipping station. It may, perhaps, be said that milk cannot be hauled by wagon more than three, or, at most, five miles, since this distance must be traversed at least twice each day. Tobacco, however, may profitably be hauled fifty miles to market, since many a farmer's whole crop may be removed by an ox-cart at a single trip. But distance is no longer expressed in miles. Much depends on the efficiency of the facilities for transportation. Milk is hauled from the St. Lawrence River to New York City daily; while many farmers only fifty miles from New York can not ship milk for lack of adequate facilities. It costs less to ship wheat from Chicago to New York than from interior points in the North Atlantic states to the same market. To what extent this influences the price of wheat at

interior points depends somewhat on whether or not the farmers raise sufficient wheat to supply the demands of the local miller. All of these points have to be studied in connection with the management of a farm, and the products adapted both to the natural and to the artificial conditions.

CHAPTER XI

A FARM PROBLEM

PAPER FARM

THIS farm is to be located in Tompkins county, New York, within three miles of a creamery, and is to consist of 140 acres valued at \$35 per acre. Ten acres of this are to be in woodland, managed with a view to cutting so as to maintain its maximum efficiency, trees comprising chestnut, oak and white pine; five acres to consist of an apple orchard of Baldwin apples in full bearing, thirty acres of permanent pasture too rough to plow, five acres of waste land, and ninety acres of arable land, five acres of which are in alfalfa. On this farm are to be kept fifteen cows, twenty ewes, five sows and fifty hens, and such other stock as would naturally follow. The farm is to possess the necessary buildings, including a silo of eighty-five tons capacity, a place for the storage of forty tons of roots and shelter suitable for raising winter lambs, and is to be properly fenced for the stock. The purpose of this problem is not to suggest an ideal system of farming, but to acquaint the student with the problems involved in ordinary farm operations. It is to be assumed that he is moving upon this farm on the first day of April, with the necessary equipment to run it successfully, and is

to make a statement concerning its operation for one year under the following specific heads:

A. Give an outline of the plan of management, including the rotation of crops, the total area in each crop, yield per acre and total production of each crop. State the character of animal products that it is expected to sell, and state the yield that it is expected may be obtained, as the butter-fat per cow, wool per sheep, eggs per hen, etc. It is expected that, under this head, an intelligent idea of the system of management will be given.

B. Give an inventory of the property at the beginning of the year, classified under the three heads of plant, materials and supplies. In these inventories include such materials and supplies as may be necessary to putting in the crops and carrying the stock until materials and supplies have been raised, except in so far as current income may be available for purchase of such materials and supplies. The purpose is to determine how much money must be borrowed at the bank. Give an inventory at the end of the year. In this inventory include all materials and supplies that would naturally be carried over for the conduct of the next year's business. Items common to both inventories need not be repeated. (See page 118.) State the amount of increase or decrease in inventory. Take the average of the two inventories, and calculate the interest at 5 per cent.

C. Give an itemized statement of receipts and expenditures for the year, and state the balance. Do not include taxes, household or personal expenses. Under this head there will be the following three items:

1. Cash balance.
2. Farm income.
3. Labor income.

The cash balance is the difference between the receipts and expenditures.

The farm income is the cash balance plus or minus the difference between the two inventories.

The labor income is the farm income less the interest at 5 per cent—or such other interest as may seem proper—on the average of the two inventories.

A. THE GENERAL METHOD OF MANAGEMENT

THE CROPPING SYSTEM, WITH AREAS AND PRODUCTION

5 acres waste land and small lots.	
10 acres woodland, 2,000 feet each of oak, chestnut and pine, 100 posts and 20 cords wood.	
5 acres Baldwin apples, at 80 barrels per acre . . .	400 barrels
25 acres pasture for 15 cows.	
5 acres pasture for 20 ewes.	
5 acres alfalfa, at 3 tons per acre	15 tons
30 acres three-course rotation, as follows:	
¹ (1) { 8 acres potatoes, at 150 bushels per acre	1,200 bushels
1.5 acres mangels, at 20 tons per acre . . .	30 tons
0.5 acres rutabagas, at 16 tons per acre . .	8 tons
(2)—10 acres oats grain, at 40 bushels per acre	400 bushels
oats straw, at 1 ton per acre . . .	10 tons
(3)—10 acres clover, first crop, at 1.5 tons per acre	15 tons
buckwheat grain, at 15 bushels per acre	150 bushels
buckwheat straw, at .75 ton per acre : : :	7 5 tons

¹ Figure in parenthesis indicates year of rotation.

THE CROPPING SYSTEM, WITH AREAS AND PRODUCTION—Cont'd.

55 acres seven-course rotation as follows:

(1)—8 acres maize for silage, at 11 tons per acre	88 tons
(2)—8 acres maize grain, at 35 bushels per acre	280 bushels
maize stover, at 1.25 tons per acre	10 tons
(3)—8 acres oats grain, at 40 bushels per acre	320 bushels
oats straw, at 1 ton	8 tons
(4)—8 acres wheat grain, at 20 bushels per acre	160 bushels
wheat straw, at 1 ton	8 tons
(5)—8 acres timothy and clover first-crop hay, at 1.75 tons per acre	14 tons
clover second crop seed, at 2 bushels per acre	16 bushels
clover straw, at .5 ton per acre	4 tons
(6)—8 acres timothy and clover hay, at 1.75 tons per acre	14 tons
(7)—7 acres timothy, at 1.75 tons per acre	12 tons

140 acres total area of farm.

Cash Crops—

Apples	400 barrels
Potatoes	1,200 bushels
Buckwheat	150 bushels
Wheat	160 bushels
Clover seed	16 bushels
Timothy and clover hay	23 tons
Timothy hay	12 tons
Wood, 6,000 feet lumber in log, 100 posts and 20 cords wood.	

Concentrates as Food for Live Stock—

		Dry matter Lb.
Oats	720 bushels	20,488
Maize	280 bushels	13,965
Mangels	30 tons	6,600
Rutabagas	8 tons	1,215
Skim-milk	40 tons	8,000
		<hr/> 50,268

THE CROPPING SYSTEM, WITH AREAS AND PRODUCTION — Cont'd.

Roughage as Food for Live Stock—

Silage	85 tons	51,000
Stover	5 tons	6,000
Alfalfa hay	15 tons	25,500
Clover and timothy hay	6 tons	10,200
Clover hay	15 tons	25,500
		<hr/>
		118,200

Roughage as Bedding for Live Stock—

Straw oats	18 tons
Straw wheat	8 tons
Straw buckwheat	7.5 tons
Straw clover	4 tons
Stover maize	5 tons
	<hr/>
	42.5 tons

Animals and Animal Products Sold—

Butter-fat from 15 cows, at 240 pounds per cow .	3,600 pounds
Veal	12 calves
Pork, 50 pigs at 180 pounds each	9,000 pounds
Winter lambs	10 lambs
Wool, 20 sheep at 8 pounds each	160 pounds
Eggs, 50 hens at 10 dozen each	500 dozen
Poultry	50 hens and 50 cockerels

Cows are to drop calves in August, September, October and November, and to be dry, as far as possible, during portions of June, July and August. Twelve calves are to be sold as veal, and three heifers are to be raised each year to replenish the herd. Sows are to drop pigs in April and November. The rutabagas, most of the skim-milk, and one-half the maize raised for grain are to be fed to the pigs. The stover from this maize is to be fed to the horses in the winter. The other five acres of maize are to be fed to the ewes

and lambs without husking. Sheep are also to have the mangels and alfalfa hay. Cows will be fed silage, clover hay, gluten meal, brewers' grains and bran. Horses will be fed oats, mixtures of clover and timothy hay and maize stover. In estimating the food requirements of the horses, cattle and sheep, the basis is the food consumed daily. In estimating the food requirements for swine, it is assumed that five pounds of dry matter will be required for each pound of increase in the young pigs, it being expected that this amount will be sufficient to rear the growing pigs and to maintain the mature ones.

FOOD REQUIRED FOR LIVE STOCK

5 horses and 2 colts, 6 horses—

Hay, 15 pounds per day each for 315 days . . .	14 tons
Stover, 15 pounds per day each for 50 days . . .	3 tons
Oats, 10 pounds per day each	660 bushels

15 cows, 1 bull and 3 heifers, 17 cows—

Hay, 10 pounds per day each for 200 days . . .	17 tons
Silage, 40 pounds per day each for 250 days . . .	85 tons
Concentrates, 6 pounds per day each for 200 days .	10 tons
Mangels, 8 pounds per day each for 200 days . . .	13 tons

20 ewes, 1 ram and 20 lambs, 31 sheep—

Hay, 1.5 pounds per day each for 200 days . . .	5 tons
Maize fodder, 1.5 pounds per day each for 200 days .	5 tons
Mangels, 5 pounds per day each for 200 days . . .	15 tons

5 sows, 1 boar and 50 pigs, 9,000 pounds pork live weight—

Maize grain, 2.5 pounds for each pound increase .	400 bushels
Wheat middlings, 1 pound for each pound increase .	5 tons
Skim-milk, 8 pounds for each pound increase . . .	36 tons
Rutabagas, 2 pounds for each pound increase . . .	9 tons

SUMMARY OF FOOD REQUIRED		
Roughage—		Dry matter Lb.
Hay	36 tons	61,200
Stover	5 tons	6,000
Silage	85 tons	51,000
		118,200
Concentrates—		
Oats	680 bushels	19,366
Maize grain	500 bushels	24,920
Wheat middlings	5 tons	8,900
Wheat bran	4 tons	7,120
Gluten meal	3 tons	5,340
Brewers' grains	3 tons	5,340
Mangels	30 tons	6,600
Rutabagas	8 tons	1,215
Skim-milk	40 tons	8,000
		86,801

FERTILIZERS

Potatoes are to be fertilized with 400 pounds per acre of a 4-8-8 fertilizer, and wheat is to be fertilized with 250 pounds per acre of a 2-12-2 fertilizer.

Live stock will consume 204,206 pounds, or about 102 tons of dry matter. Estimating three pounds of excrement for each pound of dry matter consumed, and adding 42.5 tons of bedding, total fresh manure produced will be 348 tons. Part of this manure will be hauled to the field during winter and spring and placed upon maize stubble. It will not be placed upon timothy sod, because this field is to be fall-plowed. The rest of the manure will be placed upon the land which is to go into potatoes. This will be done after removing the buckwheat, when the land will be immediately

plowed. It is assumed that this manure has been stored in a covered barnyard. Under these conditions, it is estimated that there will be hauled to the field one ton of manure for each two tons produced, or 174 tons, which will be distributed upon eighteen acres of land.

If difficulty is found in obtaining a clover catch upon the seven-course rotation, lime at the rate of 1,000 pounds per acre will be applied just before planting the silage maize. If difficulty is found on the three-course rotation, lime will be applied at the rate of 500 pounds per acre to land intended for oats. In calculating expenses, it has been assumed that lime was not required. Under the above management, it is believed that the crop-producing capacity of the farm would improve, notwithstanding the large sale of hay. It is believed that occasionally the manure may be omitted from the three-course rotation and applied to the apple orchard.

B. INVENTORY

THE PLANT		April 1 1905	April 1 1906
The real estate, 140 acres at \$35		\$4,900 00	\$4,900 00
The live stock—			
5 horses, at \$150	\$750 00		
15 cows, at \$40	600 00		
20 ewes, at \$5	100 00		
5 sows, at \$10	50 00		
1 bull, at \$100	100 00		
1 ram, at \$15	15 00		
1 boar, at \$25	25 00		
52 chickens, at 60 cents	31 20		
		1,671 20	1,587 64

Brought forward—		THE PLANT—Continued		April 1 1905	April 1 1906
Real estate				\$4,900 00	\$4,900 00
Live stock				1,671 20	1,587 64

Machinery—

2 14-inch plows	\$25 00		
1 double-acting cutaway harrow	30 00		
1 spring-tooth harrow	20 00		
1 adjustable smoothing harrow	20 00		
1 wooden drag	5 00		
1 potato planter	65 00		
1 7 x 11 grain drill, seeder and fertilizer attachment	65 00		
2 five-tooth double cultivators	50 00		
1 five-tooth cultivator	10 00		
1 mowing machine	45 00		
1 one-horse spring-tooth hay rake	15 00		
1 potato digger	30 00		
1 spraying outfit for apples and potatoes	30 00		
1 farm wagon and hay rack	75 00		
1 low wagon	40 00		
1 bob sled	30 00		
1 two-horse light wagon	75 00		
1 road wagon	100 00		
2 pairs double harness	80 00		
1 single work harness	20 00		
1 single light harness	25 00		
Stable supplies	25 00		
Small tools	50 00		
1 hand separator	75 00		
1 Babcock tester and scales	15 00		
Dairy utensils	10 00		
		1,030 00	927 00
Total plant		\$7,601 20	\$7,414 64

Seeds—	MATERIALS	April 1 1905	April 1 1906
Potatoes, 128 bushels at 75 cents . .	\$96 00		
Oats, 36 bushels at 50 cents	18 00		
Maize, 3 bushels at \$1.50	4 50		
Clover seed, 3 bushels at \$8	24 00		
Buckwheat, 10 bushels at 75 cents . .	7 50		
Wheat, 12 bushels at \$1	12 00		
	<hr/>	\$162 00	\$162 00
Feed—			
Hay for cattle, 5 tons at \$9	45 00		
Hay for sheep, 1 ton at \$9	9 00		
Silage for cows, 25 tons at \$2 . . .	50 00		
Maize for pigs, 200 bushels at 60 cts.	120 00		
	<hr/>	224 00	224 00
Growing wheat, 8 acres at \$5.50 per acre		44 00	44 00
Live stock—			
10 lambs, at \$5	50 00		
2 colts, at \$60	120 00		
3 calves, at \$20	60 00		
	<hr/>		230 00
Total materials		\$430 00	\$660 00

SUPPLIES

Hay for horses, 5 tons at \$11	\$55 00		
Oats for horses, 300 bushels at 40 cents .	120 00		
Money for living expenses 6 mos. at \$50 .	300 00		
	<hr/>		
Total supplies		\$475 00	\$475 00

SUMMARY

Plant	\$7,601 20	\$7,414 64
Materials	430 00	660 00
Supplies	475 00	475 00
	<hr/>	
	\$8,506 20	\$8,549 64
Increase of capital		\$43 24
Interest on capital, \$8,527.92 at 5 per cent		426 40

The value of the live stock on April 1, 1906, was obtained by deducting 5 per cent from the value of the inventory on April 1, 1905, and the value of the machinery has been obtained by decreasing the value 10 per cent. Under materials and supplies, those items have been inventoried which are to be carried over each year from the preceding year. In the case of seeds, the amount required has been deducted from the amount produced in estimating sales. These items, therefore, need not enter into the expense account, as they are a part of the permanent investment. It is assumed that other expenses, aside from \$300 for living expenses, can be met out of current income.

C. RECEIPTS

Apples, 400 barrels at \$1.25	\$500 00
Potatoes, 1,000 bushels at 45 cents	450 00
Buckwheat, 140 bushels at 60 cents	84 00
Wheat, 145 bushels at 80 cents	116 00
Clover seed, 13 bushels at \$5	65 00
Timothy and clover hay, 23 tons at \$10	230 00
Timothy hay, 12 tons at \$11	132 00
Wood, 6,000 feet lumber in log at \$12	72 00
100 posts at 15 cents	15 00
20 cords stove wood at \$3	60 00
Butter-fat, 3,600 pounds at 22 cents	792 00
Veal, 12 calves at \$10	120 00
Pork, 9,000 pounds at 5.5 cents	495 00
Winter lambs, 10 at \$9	90 00
Wool, 160 pounds at 20 cents	32 00
Eggs, 500 doz. at 18 cents	90 00
Poultry, 100 head at 40 cents	40 00
	<hr/>
	\$3,383 00

C. DISBURSEMENTS

Labor, two men, each 12 months at \$30 per month	\$720 00
Extra help by the day	150 00
Feed, wheat middlings for pigs, 5 tons at \$20	100 00
Maize for pigs, 220 bushels at 60 cents	132 00
Gluten meal for cows, 4 tons at \$20	80 00
Brewers' grains for cows, 3 tons at \$20	60 00
Bran for cows, 3 tons at \$20	60 00
Seeds, timothy, 3 bushels at \$2	6 00
Mangels, 12 pounds at 25 cents	3 00
Rutabagas, 2 pounds at 25 cents	50
Fertilizers, potato 4-8-8 grade, 2 tons at \$25	50 00
Wheat, 2-12-2 grade, 1 ton at \$18	18 00
Spraying materials	20 00
Binder, 36 acres at 50 cents per acre	18 00
Binder twine, 36 acres at 30 cents	10 80
Threshing, wheat 160 bushels at 4 cents	6 40
Buckwheat, 150 bushels at 4 cents	6 00
Oats, 720 bushels at 3 cents	21 60
Clover seed, 16 bushels at 75 cents	12 00
Service fees, 2 mares	50 00
Apple barrels, 400 at 35 cents	140 00
Blacksmithing and repairs	50 00
Silage cutting, 5 days at \$7	35 00
For incidental expenses, add 10 per cent	175 43
	<hr/>
	\$1,924 73
Cash balance	\$1,458 27
Farm income	\$1,501 51
Labor income	1,075 11

As a part of work in a course in farm management, the author asks each student to secure the financial history of an actual farm covering a period of three years. The following is an illustration of a 200-acre farm devoted to general farming:

FINANCIAL HISTORY OF FARM FOR THREE YEARS

Location, New York State.

Size, 200 acres.

Area in timber, 25 acres.

THE NUMBER OF ACRES IN CROPS EACH YEAR

	1901	1902	1903
Maize	15	15	22
Wheat			
Oats	12	12	15
Other cereals			2
Meadow	35	35	23
Pasture	110	110	110
Tree fruits			
Small fruits			
Potatoes	3	3	3
Other vegetables			
Total	175	175	175

TOTAL CASH RECEIPTS

	1901	1902	1903
Wheat			
Maize	*	*	*
Oats	*	*	*
Other cereals			*
Hay, straw or other forage .	*	*	*
Potatoes	\$156 00	\$114 15	\$56 30
Tree fruits			
Small fruits			
Horses	400 00		
Cattle	275 00	320 00	325 00
Sheep and wool			
Swine	40 00	35 00	25 00
Dairy products	2,166 87	2,467 54	2,702 14
Poultry and poultry products			
Miscellaneous items			
Total	\$3,037 87	\$2,936 69	\$3,108 44

* Fed to live stock or used for bedding.

TOTAL EXPENDITURES (not including family expenses)

	1901	1902	1903
Labor ¹	\$450 00	\$450 00	\$450 00
Board of laborers, estimated	135 00	135 00	145 00
Feed and seeds	480 00	757 00	625 00
Fertilizers	20 00	20 00	17 00
Machinery and repairs	55 00	25 00	130 00
Buildings and fences	320 00	50 00	60 00
Live stock	280 00	375 00	284 00
Miscellaneous items			
Total	\$1,740 00	\$1,812 00	\$1,711 00

THE ESTIMATED VALUE OF CAPITAL AT BEGINNING
AND END OF PERIOD

	Beginning	End
Real estate	\$12,000 00	\$13,000 00
Machinery and tools	250 00	350 00
Farm teams	450 00	325 00
Other live stock	2,500 00	3,500 00
Grain and other feed	175 00	275 00
Miscellaneous		
Total	\$15,375 00	\$17,450 00

The average receipts and expenditures of thirty farms for the years 1901, 1902 and 1903 are given below. The author has not made any selection of farms, although, doubtless, the students have selected types of the more thrifty farmers. Most of these farms are located in New York State, although farms in several other states are included. A considerable variety of types of farms is represented, as may be inferred by comparing Nos. 10, 20 and 27. In the case of No. 27,

¹ If members of farmer's family are employed without compensation as included above, state under "remarks" the amount of work thus performed.

the owner has calculated a greater area in crops than he has area in land, because he raised one crop between the rows of another crop.

FINANCIAL HISTORY OF FARMS FOR YEARS 1901, 1902 AND 1903

No.	Size of farm, acres	Area in crops, acres	Average yearly receipts	Average yearly expenditures	Increase or decrease in inventory.
1	200	168	\$4,000	\$2,071	\$5,150
2	132	132	4,533	2,733	7,000
3	200	191	2,692	1,345	2,900
4	210	150	1,702	1,177	—
5	80	61	1,395	481	455
6	145	113	1,921	963	1,400
7	33	33	2,396	773	100
8	120	94	5,018	2,308	3,255
9	95	78	3,067	1,703	860
10	120	112	14,130	9,117	6,400
11	169	147	1,982	1,109	970
12	275	229	2,815	1,539	1,330
13	300	227	6,107	2,062	3,600
14	133	133	1,627	642	1,125
15	30	30	1,734	677	150
16	373	324	2,508	865	1,812
17	58	56	3,915	1,373	2,100
18	231	221	7,566	5,104	2,350
19	200	166	2,963	1,324	2,245
20	200	175	3,207	1,588	2,075
21	74	77	688	782	1,336
22	57	56	977	674	275
23	65	65	7,858	3,324	5,300
24	160	80	1,235	1,198	2,400
25	150	120	3,069	1,430	200
26	180	126	1,045	178	300
27	26	35	5,500	3,300	—
28	60	50	2,177	1,362	900
29	148	118	7,980	4,819	1,100
30	68	68	2,594	1,196	895

Below is given a summary of the financial history of the thirty farms just mentioned above, and also of twenty-eight other farms mostly for the years 1902, 1903 and 1904, which it is not deemed necessary to give in detail:

SUMMARY OF FINANCIAL HISTORY OF FARMS

	Thirty farms	Twenty- eight farms
Average size of farm	143.2 acres	133 acres
Average area in crops (includes pasture) .	121.1 acres	112 acres
Capital at end of three-year period . .	\$14,009	\$8,893
Capital at beginning three-year period .	12,962	7,704
Difference	1,047	1,189
Interest on capital, \$13,485 at 5 per cent ¹ .	674	415
Increase in capital per annum	349	396
Average yearly receipts	3,613	2,208
Average yearly disbursements	1,907	1,221
Average yearly cash balance	1,706	987
Average yearly farm income	2,055	1,383
Average yearly labor income	1,381	968

It appears, from this presentation, that it has not been impossible for a thrifty farmer, during the years mentioned, to earn a comfortable livelihood even after paying 5 per cent interest on the capital invested. That many farmers do not do so well is not evidence that their farms could not be made to do so, if judiciously managed.

In the twenty-eight farms summarized in the second column, the amount of capital invested was consider-

¹\$13,485 obtained by dividing by 2 the sum of capital at beginning and end of three-year period.

ably less and the labor income was considerably less, notwithstanding less was deducted because of interest on the investment. It will be noticed that in the theoretical farm the labor income was between that of the two sets summarized above. While, as previously indicated, these farms represent more than average conditions and results, they do not, as a rule, possess extraordinary features. The results given, therefore, may be taken as a guide to what intelligent management and energetic effort can hope to accomplish. Many individual instances could be cited of much greater incomes. While these phenomenal incomes owe much to intelligent forethought, close application, and sometimes to scientific knowledge, usually upon careful investigation there will be found some unusual circumstances, as, for example, high price for the products sold, which account for the increased profits and which make the results of such farms unsafe guides in estimating the income to be expected from a farm under ordinary conditions.



FIG. 20. Residence and farm buildings on a Massachusetts farm. Note that principal buildings are under one roof.

CHAPTER XII

THE NORTH ATLANTIC STATES

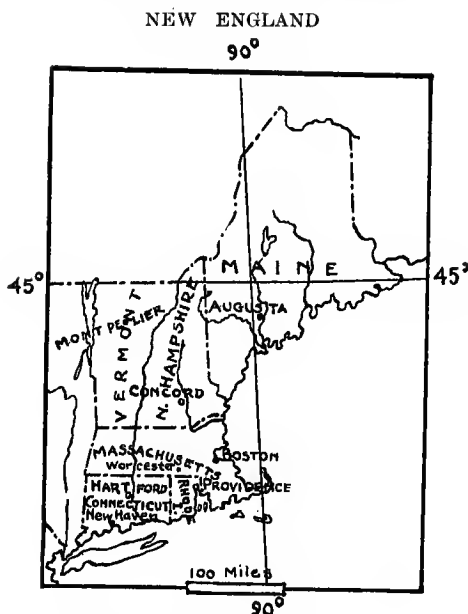


FIG. 21. New England.

Population, numbers 5,592,017

¹Farms, numbers 191,888

¹"Where the land owned by one person, firm or corporation is divided among two or more tenants, or is under the management of two or more persons, the part occupied or cultivated by each must be fully reported as a separate farm in the name of its tenant or manager." (Twelfth Census of the United States, Vol. V, pp. 758, 759.)

Land area, acres	39,662,720
¹ Area in farms, acres	20,548,999
² Improved area in farms, acres	8,134,403
Average size of farms, acres	107.0
Average size of improved area, acres	42.3
Average value per acre	\$25.75

THE land area of the New England states is principally adapted to the growth of trees and grass. It was originally a wooded country, and much of it remains so, as indicated by the fact that only about one acre in five of the total land area is improved farm land. Some areas that were formerly cleared have been wisely allowed to revert to forests. That portion which has been permanently cleared of the forests is mainly in pastures and meadows, and is the basis of a large dairy industry, horses, sheep and swine being at present reared in comparatively small numbers. Poultry is reared in considerable numbers, and the industry is increasing rather rapidly.

The coastal plain contains some excellent truck soils, and some of the river valleys are devoted to considerable trucking and to special crops, as cucumbers and onions. The Connecticut River Valley is the seat of an extensive tobacco industry, to which certain types of soil, such as Norfolk gravelly loam, Norfolk sand, Norfolk sandy loam, and Podunk fine sandy loam are especially adapted. Aroostook county, Maine, is espe-

¹ Under the *total area in farms* are included "all outlying or separate meadows, pastures, wood-lots, marshes, etc."

² Under *unimproved land* is included "land which has never been plowed, mown or cropped, including land once cultivated but now grown up to trees or shrubs." *Improved land* includes "all not reported as unimproved." Op. cit.

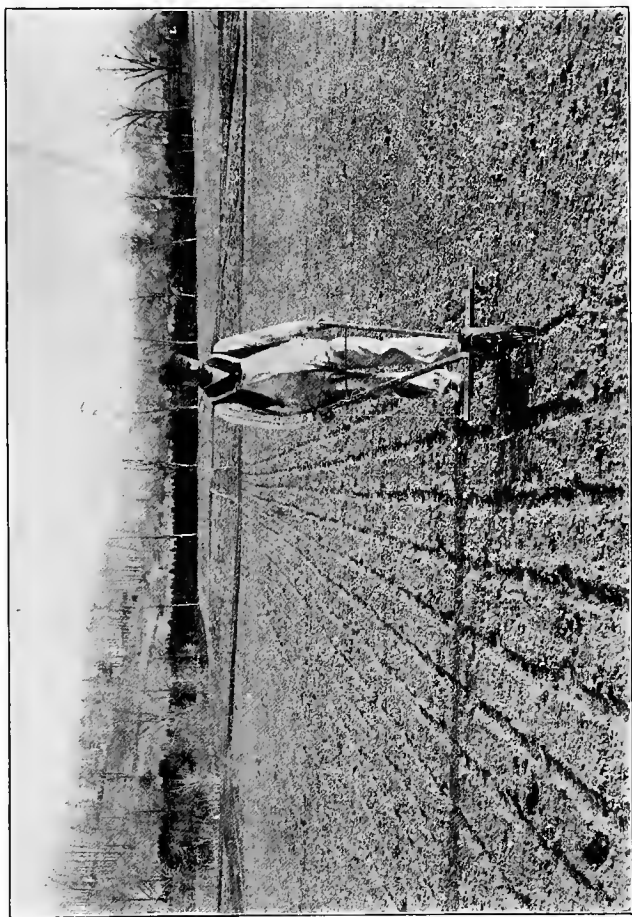


FIG. 22. Truck lands in Massachusetts.



FIG. 23. Hay harvesting on a Connecticut farm. The ox team is typical.

cially noted for the large acreage and large yields per acre of potatoes of good quality. Wheat has never been largely raised in New England, and maize is raised chiefly, at present, for silage. As compared to other portions of the United States, the acreage in rye is large. In the northern portion, the oat is the principal grain crop.

The soils are from the drift deposit, some of them having been reworked by lake or river action. About three-fourths of the area has boulder clay for its basis, and, while hard to farm, it is fairly fertile. About one-fourth of the area is composed of the coarser and more sandy parts of the drift, and this produces poor soil. This is fit only for timber, to which it is well adapted. Over 840,000 acres of soil have been surveyed in the Connecticut Valley in Massachusetts and Connecticut. Here fourteen types, mostly stony, gravelly and sandy loams, have been recognized.¹

The farms are of moderate size, the most common area being between 50 and 175 acres, but the improved area is small, being only about two-fifths of the total area. The farms are apt to have uneven, small and irregular-shaped fields. Much of the soil contains gravel, stones and boulders ranging from one inch or less to twelve feet or more in diameter. Quantities of the large stones have been removed and placed in stone fences, which form such a prominent feature of the landscape in these states. Some types of soil of considerable extent still contain from 10 to 50 per cent of gravel and stones.

¹ U. S. Dept. of Agr., Bu. of Soils, Field Operations, 1903, pp. 33-61.

The climate is somewhat different in different portions of this district, but is modified by the comparatively warm waters of the ocean, which, it is said, make the climatic conditions of southeastern Massachusetts similar to those of southern Pennsylvania. On the whole, however, the climate is rather severe, although healthful. The area is well watered, the rainfall being above forty-five inches in most places in the district. Usually the water-supply is abundant and pure.

The New England states contain less than two acres of improved land for each inhabitant. Moreover, Greater New York is practically a local market for the New England states. Besides the greater center of population in and about Boston and New York, the New England states contain a number of cities of moderate size, making favorable opportunities for the sale of products and the purchase of supplies. With the exception of the dairy industry, the farming is not largely segregated, although tobacco-growing in the Connecticut River Valley and potato-raising in Aroostook county, Maine, are examples of such segregation. Specialty farming, however, has probably reached as high a development in Massachusetts and Connecticut as anywhere else in the United States.

The farming population is largely the descendants of the early Puritans, or what is known as native American stock. There is recently, however, a marked increase of foreigners, mostly Poles and Italians. Generally these immigrants first become farm laborers, and subsequently farm owners where they engage in farming of an intensive character. In some sections



FIG. 24. Potato farm in Connecticut. This farm has a record of 350 bushels of potatoes per acre.

they have become both an economic and a social factor.

The farm lands of the New England states are unequally situated with regard to shipping facilities: some have most excellent advantages, while others are subject to considerable disadvantages. Electric lines furnish some sections opportunities for the shipment of smaller products. The public highways of some states, notably Massachusetts and Connecticut, have been greatly improved, being perhaps the best in the United States. The farms being laid out in advance of a government survey, the farmstead was located with reference to the exigencies of the original settler, shelter and water-supply being perhaps the controlling factors, and the highways were built to conform to the farmer's dwelling and, to some extent, to the contour of the land.

The improvements on the farms of the New England states are among the best in America. The value of the farm-buildings constitutes a larger percentage (46.6) of the total value of the farms than that in any other region of the United States.

The farms of this region generally have an abundance of timber of the broad-leaved hardwood varieties, together with some of the narrow-leaved sorts, furnishing an abundance of wood for all farm purposes and being a source of cash income. White and red pine, Norway spruce, chestnut and black locust are considered suitable for planting in this region. It is stated that at the age of forty years the average planted white pine in New England is eight inches in

•

diameter and 48.5 feet high.¹ While most farms have their orchards for home use and sometimes for the sale of fruit, commercial orcharding has not been developed so largely in this region as elsewhere.

When it is recalled that nearly one-half the value of the farms is in the buildings, the value of farm lands in the New England states must be considered low. On the other hand, only about two-fifths of the area is improved land. Very great differences exist in value in different locations and upon different soils. Within comparatively limited areas lands vary in value from \$3 per acre on hilly areas to \$250 per acre in the fertile river valleys. In some instances truck farmers pay an annual rental of from \$20 to \$30 per acre. Over four-fifths of the farms of this region are managed by their owners,—the New England states enjoying the distinction of having the largest proportion of farm-owning farmers of any farm region in the United States.

The farming condition of the New England states has been the cause of considerable discussion concerning worn-out and abandoned farms. While it is true that the virgin freshness of these soils has long since disappeared, and some of the lands have been allowed to revert to forests and others have been found more useful for summer homes than as self-supporting farms, the conditions which have brought this about have been economic and social rather than being due to a material decrease in soil-fertility. Some of the economic changes will remain constant, but others are temporary and are rapidly passing away. It may be

¹ United States Department of Agriculture, "Year-book," 1902, p. 137.

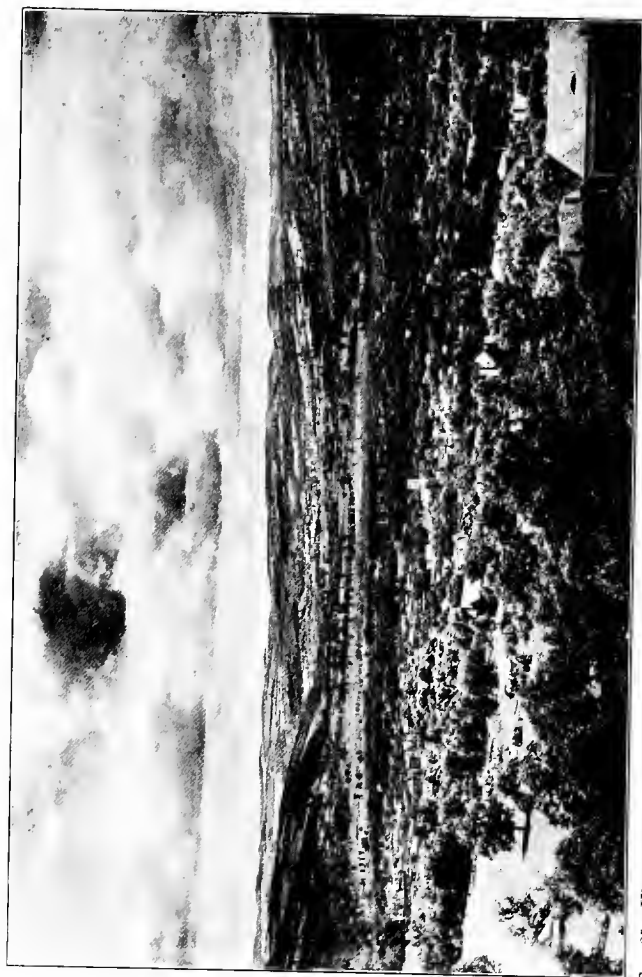


FIG. 25. View of farm lands among the finger lakes, central New York. Land largely in trees and grass. Distant hills about 1,000 feet above valley. The valley has been formed by the receding of Cayuga Lake.

confidently predicted that the agriculture of the New England states will continue to improve, and that its prosperity will be abiding. For people of proper training and tastes, favorable opportunities for the purchase of farms are to be found in this region.

SOUTHERN NORTH ATLANTIC STATES

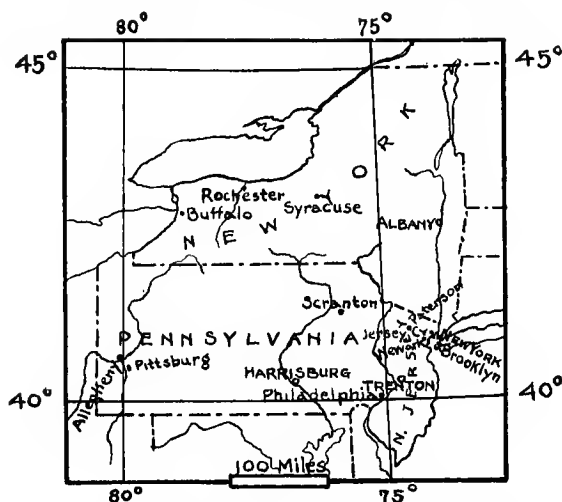


FIG. 26. Southern North Atlantic States.

Population, numbers	15,454,678
Farms, numbers	485,618
Land area, acres	64,083,200
Area in farms, acres	44,860,090
Improved area in farms, acres	30,786,211
Average size of farms, acres	92.3
Average size of improved area, acres	63.3
Average value per acre	\$43.31

While the states of New York, New Jersey and Pennsylvania are, like the New England states, adapted to trees and grass, and therefore to the farm industries based on trees and grass, yet these southern North Atlantic states have a greater adaptation to the cereals than New England. New England has one acre in sixteen of its improved area in wheat, maize, oats, rye, barley and buckwheat; while the remaining three North Atlantic states have one acre in four. This adaptation to the growth of the concentrated foods is most marked in southeastern Pennsylvania and in western New York and Pennsylvania, where the physiographical features are similar to those of the Ohio Valley.

The North Atlantic states as a whole, however, fall far behind the North Central states in their economic adaptation to the raising of cereals:

COMPARATIVE ACREAGE OF CEREALS AND HAY

	North Atlantic	North Central
Cereals, million acres	9.0	119.3
Hay and forage, million acres	12.9	35.6
Cereals, per cent of improved area	23.0	53.7
Hay and forage, per cent of improved area	33.2	16.0

In its natural state the southern North Atlantic region was covered with a dense forest, the narrow-leaved trees occupying the upper regions and the broad-leaved the lower regions. Few, if any regions, rehabilitate themselves more readily with tree growth of economic importance.

The improved area in New York State can be divided into three nearly equal parts, one part being in

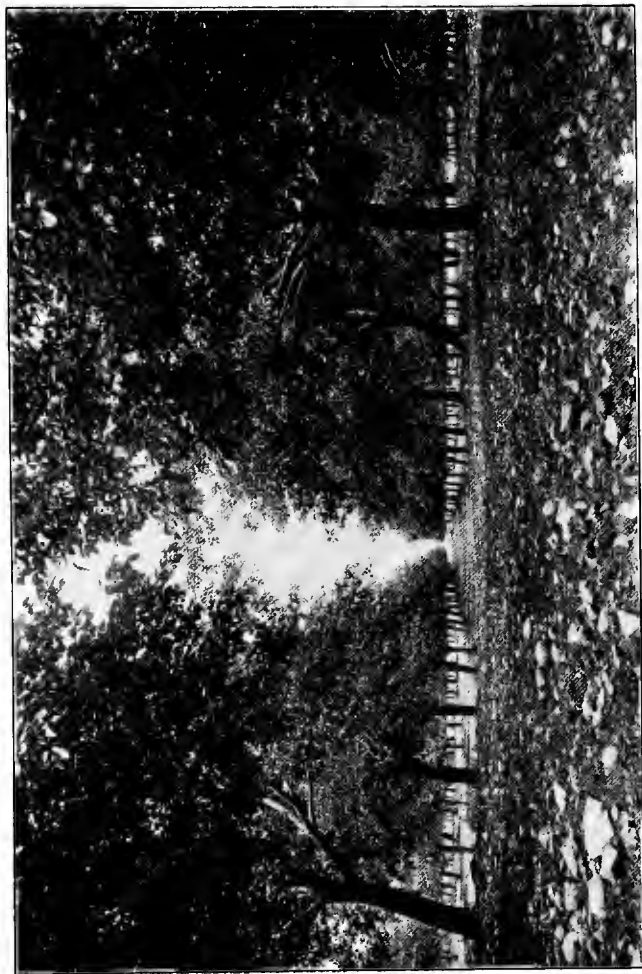


FIG. 27. Apple orchard in Niagara county, New York. The principal apple counties of New York are Niagara, Monroe, Orleans and Wayne.

pasture, another in meadow, while one-third is devoted to all other crops. Pennsylvania contains a rather larger proportion of cereal and less proportion of meadow, while New Jersey is more largely given to trucking interests. Western New York is famous for the production of large quantities of apples of high quality, while other horticultural crops are highly developed in this and other portions of the region. Buckwheat, beans and white potatoes are relatively important crops. One-eighth the hay, one-fourth the white beans and

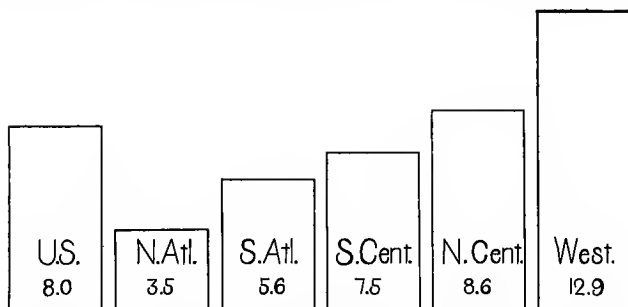


FIG. 28. The number of colts produced for each 100 horses kept in the United States, and each division thereof, as indicated by the census of 1900, taking yearling colts as a basis for such calculation.

white potatoes, and two-thirds the buckwheat produced in the United States are grown in these three North Atlantic states. Sugar-beets are grown somewhat in central New York. Upon the silt loams of the higher altitudes, root crops may doubtless find some adaptation. Timothy is the basis of most meadow, although redtop and red clover form no inconsiderable part of the hay raised; while orchard grass

and alsike clover are less frequently grown. Alfalfa thrives on certain well-drained limestone soils, notably on the Miami stony loam about Syracuse, New York. Considerable tobacco is raised along the Susquehanna River and its tributaries.

The three states under discussion contain nearly one-sixth of all the milch cows in the United States. The production, distribution and sale of milk, butter and cheese give employment to a large amount of capital and labor. Sheep and swine are reared in moderate quantities, while horses and beef-cattle have recently been less extensively reared.

The soils of this region are variable in origin, in character, in elevation and contour, and include several soil provinces, as the coastal plain, Piedmont Plateau, Appalachian Mountain, residual limestone valley and upland, and glacial lake provinces. The residual soils are to be found in the southern and eastern portions of the region, such as the Hagerstown, Penn and Cecil series. There are comparatively large areas of alluvial soils in the river valleys (Miami series in the glaciated province), while in the northwestern portion there are considerable areas of glacial lake deposits (Dunkirk series). It is estimated that over one-third the area of this region is above one thousand feet elevation.¹ At this elevation, or above, the glacial covering is so thin that the soil is more or less modified by the underlying deposits (Volusia series). In the coastal plain province the soils usually range from sands to light loams, while in the rest of the region

¹ Shaler: "United States of North America," Vol. 1, p. 62.



FIG 29 A poultry, truck, grain and fruit farm in Westchester Co., N. Y. Plum orchard and apple orchard in the distance; small buckwheat field in foreground. Observe the rolling and rocky nature of the country.

the typical soils range from loams to clays, silt constituting an important part of many of the types. There is a less proportion of stony types in this region than in New England, although they occur in large quantities. Over three million acres have been surveyed and fifty-five soil types have been recognized.

The farms are smaller than those of New England, but the size of the improved area is relatively and absolutely much larger. Much of the farm land is rolling and subject to erosion when cultivated. In general, the fields are irregular in shape, small in size and less adapted to the economic use of improved farm machinery than the North Central states. Some of the land is very fertile, and much of it stands constant cropping with no apparent diminution of yields under careful management.

Because of variations in latitude, altitude and proximity to ocean and lakes, there is considerable variation in climate. On the whole, the climate is rather severe in winter, without great extremes. A temperature of 100° Fahr. is unusual in any portion of this region, and over most of the area the Weather Bureau has no record lower than —20° Fahr. Shelter is requisite for domestic animals. The abundant snowfall in some sections often hinders travel. The summer climate is especially delightful. Over most of the region the rainfall is between thirty-five and forty inches, while on the southeastern border it is above forty inches. Springs and streams abound, and an abundance of pure water can generally be obtained at moderate depths. The exceptions, however, make it

essential that the purchaser of a farm should make careful inquiry concerning the water-supply.

This region contains about one-fifth the population of the United States. There are about two acres of improved land for each inhabitant. The urban population is of high average wealth, making an excellent local market for the highest class of farm products. Vast deposits of coal and iron have led to manufacturing, where large numbers of laboring men receive high wages in the heat and glare of furnaces. This makes an excellent demand for staple farm products. The farming has become considerably segregated and specialized. The canning of sweet maize, beans and tomatoes is largely developed in certain sections, while the drying of fruits is extensively practiced in other sections.

The farming population is principally descended from early English, German and Holland settlers, although the urban population is of the most cosmopolitan character.

Great trunk lines of railway cross this region, making it possible to move products with great ease to and from collecting and distributing centers. The internal railway development is not equal to that of other states, in part due to engineering difficulties. Trolley lines have had less influence on farm values than elsewhere. The public highways are, for the most part, not well improved, and the topography of the land frequently makes the marketing of crops difficult.

The early made roads of northeastern Pennsylvania and southeastern New York led from hilltop to hilltop because here the first settlements were made. Later the



FIG. 30. A farmstead in the Limestone Valley, Lancaster County, Pa.

farmstead and the roadways were located with reference to the contour of the land, many of the highways following river valleys or the high ridges formed by the shore-lines of glacial or preglacial lakes. In parts of the western section, the roadways follow more nearly section lines. The farm improvements are in the main fairly good, three dollars out of every eight invested in farm real estate being in buildings; although they have perhaps been declining rather than improving in recent years.

The farms are usually well supplied with wood, although in many instances the trees have been reduced below the point of greatest efficiency to the farm. White pine, hemlock, oak and chestnut are, perhaps, the most common valuable sorts.

Farm lands average high in this region, being exceeded in this respect only by the region included within Ohio, Indiana and Illinois. A larger proportion of the value in the former region, however, is in the buildings, while a smaller proportion of the total farm area is improved land. There are wide areas in the North Central states where land with equal improvements brings much higher prices than in much of this region. In southeastern Pennsylvania, however, land is valued as highly as in any portion of the United States. About two farms out of every three in New York, New Jersey and Pennsylvania are farmed by the owner; the tenure of the remaining third of the area is nearly equally divided between share and cash rent.

For a century the farmers of the North Atlantic states have suffered from the competition of those of

the North Central states. The cheapness of the land, the great ease with which the prairie regions could be brought under cultivation, and the greater adaptation of the larger fields and level or gently rolling surface to the use of labor-saving machinery have been factors in making the growth of the usual farm crops relatively less expensive throughout the great Mississippi Valley. The vast tracts of government land on which cattle and sheep could be reared at an extremely low cost not only made the rearing of cattle for beef and of sheep for mutton and wool in the North Atlantic states unprofitable, but the lack of domestic animals has tended to reduce the fertility of the soil, since the most satisfactory method of keeping up the crop-producing capacity of the soil is by a proper rotation of crops in connection with the rearing of the maximum amount of domestic animals.

No region of the United States exceeds, if it equals, the North Atlantic states in the production of grass. With the disappearance of the free grass ranges, larger numbers of both cattle and sheep will be raised in these states, much to the improvement of the farms and the general prosperity of the farmers.



FIG 31. Berry-pickers' shanties in Sussex county, Delaware. These are let free, during the berry season, to Negro families coming from farther south.

CHAPTER XIII

THE SOUTH ATLANTIC STATES

DELAWARE, MARYLAND AND DISTRICT OF COLUMBIA

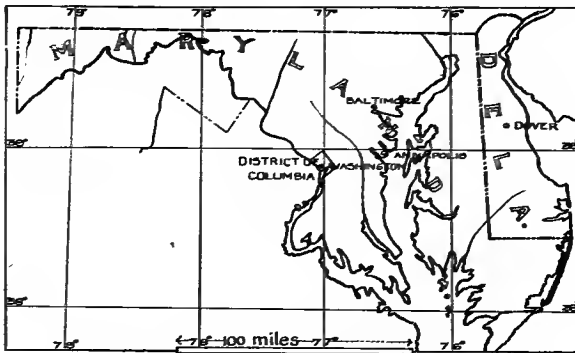


FIG. 32. Delaware, Maryland and District of Columbia.

Population, numbers	1,651,497
Farms, numbers	55,968
Land area	7,603,200
Area in farms, acres	6,244,792
Improved area in farms, acres	4,276,296
Average size of farms, acres	111.5
Average size of improved area, acres	76.4
Average value per acre	\$35.64

THIS section combines a very wide range of agricultural conditions. The Peninsula, which includes Delaware and the eastern shore of Maryland, may be compared with southeastern New Jersey and the shore

of Virginia. Central Maryland has much in common with southeastern Pennsylvania, while western Maryland is similar to West Virginia.

From the earliest settlement, the culture of maize, wheat and, in some sections, tobacco and sweet potatoes, has occupied a prominent place in the agriculture of this region. With the growth of cities and the improvement in transportation facilities, portions of this area, particularly in the Peninsula, have been devoted to the raising of vegetables and small fruits. Sussex county, Delaware, is reputed to raise the largest quantities of strawberries of any county in the world. This section is one of the most important canning regions in the United States. While the canning of tomatoes, peas and maize represents the largest part of the industry, all classes of vegetables and fruits are packed to some extent. Oysters are also packed extensively.

For three-quarters of a century the Peninsula has been famous for the quantity and quality of her peaches. Some years ago the yellows did much damage, and many of the orchards were torn out. To some extent, they have been replaced by new ones now coming into bearing. More recently peach-growing, and, to some extent, apple-growing, has developed in western Maryland.

While the Peninsula is not so well adapted to the raising of grass and the small cereals, in the central portion of Maryland good yields of wheat and grass are obtained. Cecil loam, Cecil clay and Norfolk silt loam are well adapted to these crops. Dairying is developed in north central Maryland, and northern

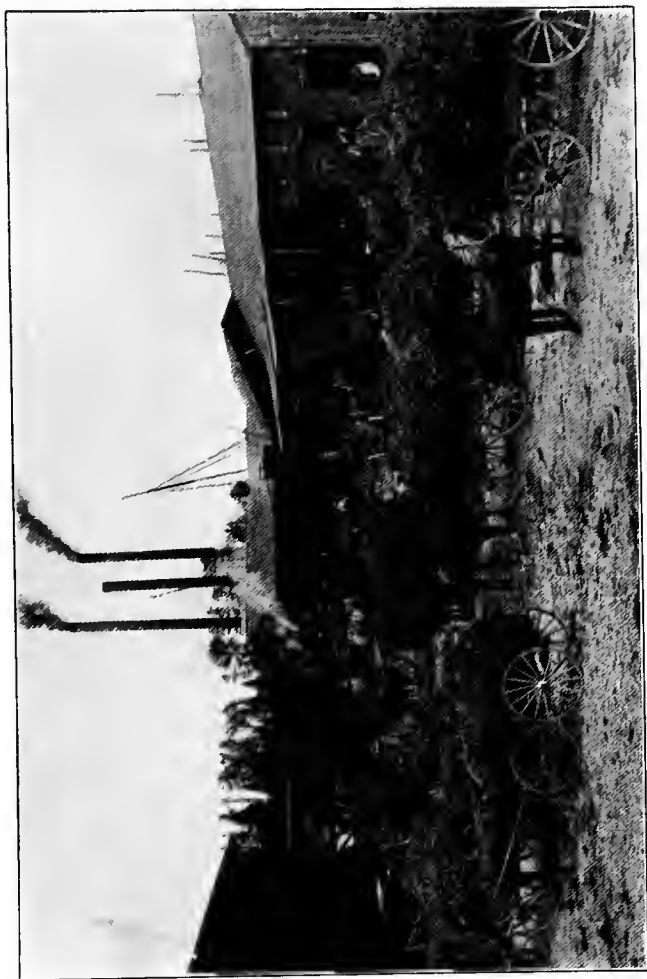


FIG. 33. Pea canning at Seaford, Sussex county, Delaware.

Delaware, where some good herds and equipment exist. In some sections, the buying and feeding of western steers is not uncommon.

The region was originally heavily covered with deciduous trees, such as oak, walnut, ash, hickory, elm, poplar, beech and willow. In this region, as in the other southern states where the soils are non-glacial, the soil types are much more distinct in character and crop adaptation than in the North Atlantic and North Central states. The coastal plain and Piedmont Plateau provinces occupy the larger portion of this region. The former soil province is comparatively level, usually occupying an elevation between sea-level and two hundred feet above, rarely three hundred feet. The soils are composed of the wash from the higher inlands, laid down under water, the surface having been several times submerged and elevated.¹ The principal soil series of this province is the Norfolk, the types of this series being noted for their sandy character and their adaptation to the growing of early vegetables, peaches and small fruits. In this province, there are large areas of Leonardtown loam containing over 50 per cent of silt and nearly 75 per cent of silt and clay, which at present are waste land or grown up in white oak and pine forests.

The Piedmont Plateau usually ranges in elevation from seven hundred to nine hundred feet above sea-level in this region, and is rolling or hilly. Its residual soils are usually composed largely of silt and

¹ U. S. Dept. of Agr., Bu. of Soils, Instructions to Field Parties, 1904, p. 50.



FIG. 34. Strawberry picking in Sussex county, Delaware.

clay, and give rise to the Cecil series. Cecil loam, Cecil mica loam and Cecil clay loam are recognized as good soils for general farming, when properly managed. Comparatively little stone or gravel exists in the soils; soils containing stone or gravel are usually forested.

The average size of farms does not give a proper idea of land-holding in this region, since it is one of contrasts. There is a considerable number of large farms frequently rented on shares in several parcels. On the other hand, trucking and market-gardening have brought about the purchase of quite small farms. The proportion of land owned in farms to the land area is considerably higher than in the North Atlantic states, and the improved area to total farm area equals that of the southern North Atlantic states, and far exceeds that of the New England states.

The summer temperature is moderately high, 104° Fahr. having been recorded at Washington, D. C., and the winter temperature comparatively mild,—17° Fahr. being the lowest record at the same station. At the National Capital, killing frosts rarely occur between April 20 and October 15. The rainfall is above forty inches throughout the area and is evenly distributed throughout the year. Disastrous storms seldom occur.

Washington, Wilmington and Baltimore afford fairly good local markets, and the transportation facilities from distributing centers by boat and by rail to northern markets are of the highest character. The facilities for getting farm produce to these distributing centers and to local markets are not good. Lands remote from water or railroads are, therefore, other

things equal, worth much less than those favorably located. In general, the public highways have not been greatly improved, although in portions of the Peninsula excellent shell roads exist.

The farming population of western and central Maryland is largely of German descent, while that of southern Maryland and Delaware is of English origin. In the former section white laborers predominate, while in the latter it is more largely colored, where the social conditions still show the results of former slavery times. About one farm in eight is worked by colored farmers.

The improvements of central and western Maryland compare favorably with those of central and southern Pennsylvania. The improvements of the Peninsula and southern Maryland are in somewhat sharp contrast with those of the North Atlantic states in that the out-buildings are generally small or wanting, due in part to climatic reasons and in part to the rearing of less numbers of domestic animals. Some of the houses of the larger estates are of a commodious and comfortable character, but, in general, the improvements are not equal to those of the regions heretofore described; although when the climatic needs are considered, the value of the buildings relative to the value of the land compares favorably,—about three dollars out of every ten invested in farm real estate being in the buildings.

While not a great deal of the woodland upon the farms has trees upon it which are of value for lumber, wood for fire and ordinary farm uses is abundant. Though there are not many commercial orchards outside of peaches and apples in western Maryland and peaches



FIG. 35. A farmstead in Sussex county, Delaware. Shell roadway left-hand corner of picture.

and pears on the Peninsula, nearly every farm contains a small orchard for domestic uses.

The average value of over thirty dollars per acre makes this region the third highest in value of farm lands in the United States. Considerable areas of unimproved land occur, notably the Leonardtown loam, which can be purchased for two dollars to five dollars per acre.

Considering the size of the region, the Bureau of Soils has mapped a large area of the soil, and the impression of the field agents of the Bureau seems to be that this region offers excellent opportunities for persons of proper training and skill. The idea expressed is that these soils fail to give good returns, or readily deteriorate under unskilful management, but with proper care they can be made to yield abundantly.

VIRGINIA AND WEST VIRGINIA

Population, numbers	2,812,984
Farms, numbers	260,760
Land area, acres	41,452,800
Area in farms, acres	30,562,396
Improved area in farms, acres	15,593,786
Average size of farms, acres	117.2
Average size of improved area, acres	59.5
Average value per acre	\$14.39

The crop adaptation of the coastal plain and Piedmont Plateau provinces which occupy the eastern half of the Virginias is similar to that described for Maryland and Delaware. The western area is occupied by the Blue Ridge and the Alleghany Mountains, with the Valley of Virginia between, while the extreme west is bordered by the Ohio Valley.

In early Jamestown days, tobacco served as a medium of exchange both locally and with the mother country; and today over much of the region tobacco is the chief money crop. Virginia has long been the largest peanut-producing state in the Union, the crop being grown principally in the southeastern part of the state. Two million acres have been surveyed represent-

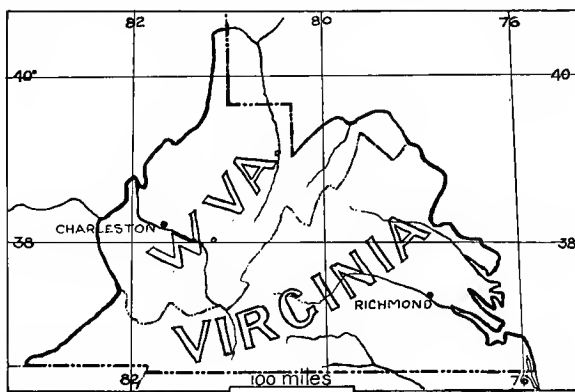


FIG. 36. Virginia and West Virginia.

ing most of the soil series to be found in Virginia. The best trucking soils are the Norfolk sand and the Norfolk fine sandy loam, the former being the earlier. Considerable areas of the Leonardtown loam occur in the coastal plain province, mostly forested with pine and gum. In the Piedmont province most of the types of the Cecil series occur, the most important being Cecil sandy loam, Cecil loam and Cecil clay. The first is used extensively for tobacco, the second for tomatoes, and the third is recognized as the best for general farming.

The Porter and De Kalb series of soils occupying the mountain areas are stony and the surface frequently very irregular and broken. Some of the types are believed to be well adapted to grazing and to apple culture, the latter industry being somewhat rapidly extended at the present time. Considerable areas of the Hagerstown series occur in the Valley of Virginia and other limestone valleys, and are usually well developed, especially the Hagerstown loam and Hagerstown clay, for general farming. The rearing of horses and sheep and the fattening of western steers are practiced in some sections of the Virginias, but dairying is not highly developed.

Since the elevation of this region varies from sea-level to over six thousand feet above sea-level, considerable variations are to be found in climatic conditions and in healthfulness. The highest recorded temperature in the mountain areas is 95° Fahr., while at Norfolk, 103° Fahr. has been reported. A temperature as low as zero has not been recorded at Norfolk, while in the Ohio Valley 20° Fahr. below is not unknown. The winter temperature of the main portion of this region is not greatly different from that of Washington and Philadelphia. At Norfolk the average period between killing frosts is April 3 to November 10.

The rainfall is about forty inches throughout the whole region, and, over portions of it, above fifty inches. The rainfall is evenly distributed, and destructive storms are unusual. The streams are numerous, and the amount of water carried comparatively large. Because of the abundance of rainfall, the steepness of

the slopes and openness of the winters, cultivated land suffers considerably from erosion.

With a total land area about equal to that of New England, and more than one-half the population, this region contains no city of one hundred thousand inhabitants or over. The population is principally distributed in the country and comparatively small towns. Manufacturing is not largely developed. The markets are, therefore, largely foreign to the region. This does not materially influence the sale of tobacco, but doubtless has considerable influence on the production of staple farm crops.

Truck-farming is perhaps as highly developed about Norfolk as in any other region in America. Crops are shipped almost continuously throughout the year to northern cities. Good facilities, both by boat and by rail, are to be had. By the former, the time from Norfolk to Baltimore and Washington is twelve hours; to Philadelphia and New York twenty hours, and to Boston, thirty-six hours. Interior points are, on the whole, rather poorly supplied with transportation facilities, which leads to little movement of farm products, except tobacco. The wheat is usually ground locally, and the other cereals fed on the farm.

The farms are decidedly variable in size, there being many farms of less than ten acres in extent, and a goodly number of more than one thousand acres. The average size of the improved area is approximately sixty acres, or about the same as in the southern North Atlantic states.

The farming population of this region probably

shows as wide divergences as are to be found in any other section of the country, owing to differences in the social origin of the white population and the differences in relationship between the white and colored population. In West Virginia, there are scarcely any colored farmers; but in Virginia, one farmer in every four is colored. About two-thirds of the white farmers and one-half the colored farmers own their farms.

While in certain regions excellent dwellings exist, the farm improvements, in the main, are not of a high order, being but about 20 per cent of the farm real estate which has a low value. The average price of land is nearly fifteen dollars per acre. While much of the land is owned in farms, it is not highly developed; and some which was originally cultivated is now overgrown with forests. It is believed that in the mountain regions there are opportunities to select areas admirably adapted to the rearing of cattle and sheep and the production of tree fruits, particularly the apple. Wherever Norfolk sand or Norfolk fine sandy loam are properly located with reference to transportation facilities, truck farming can be made quite successful.

The coastal plain region is not, however, the most healthful, and the Piedmont Plateau suffers from a lack of good pastures and, therefore, sufficient quota of domestic animals to keep up the fertility of the soils. The introduction of cow-peas has been found a helpful means of soil renovation. West Virginia offers opportunities for dairying and fruit-raising, while the trucking industry in the Ohio Valley is assuming creditable proportions.

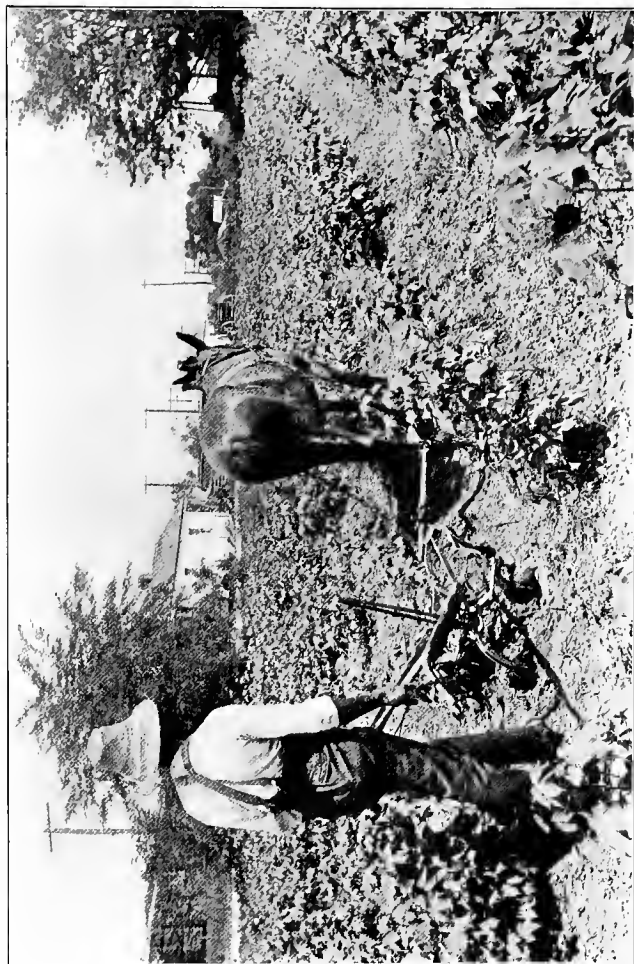


FIG. 37. Cultivating cotton in the South. Compare with FIG. 84.

THE CAROLINAS AND GEORGIA

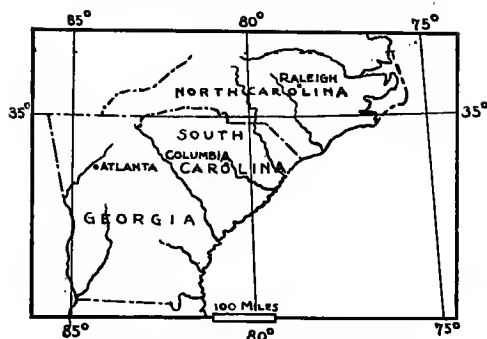


FIG. 38. The Carolinas and Georgia.

Population, numbers	5,450,457
Farms, numbers	604,683
Land area, acres	88,147,200
Area in farms, acres	63,126,427
Improved area in farms, acres	24,718,491
Average size of farms, acres	104.4
Average size of improved area, acres	40.8
Average value per acre	\$8.00

Corn (maize) and cotton have been the chief farm products of this region from the earliest times. One-half the value of the soil products of South Carolina and Georgia and one-fourth those of North Carolina are from cotton and cottonseed. The importance of maize has not been due to its special adaptation to this region, since the yields are low, but to the need of some cereal for local consumption. The smaller cereals are much less extensively raised. Maize meal, sweet potatoes, bacon and syrup have entered largely

into the dietary of the people of this region. Tobacco is an important source of income in North Carolina, rice in South Carolina, and sugar-cane in Georgia. Truck-farming and fruit-raising are being developed, the Fort Valley and Albany districts in Georgia being especially noted for the production of peaches.

The more mountainous portions are said to be adapted to the production of apples of high quality, although as yet this industry has been but little developed. Many hundreds of cars of sweet potatoes, Irish potatoes for early market, asparagus, strawberries, lettuce, cabbage, beans, peas and melons are shipped to northern markets, especially from the eastern portions of this section. The principal peanut-producing states in order of importance are Virginia, North Carolina, Georgia, Alabama and Florida. The forest growth in portions of this area is very valuable, especially in the coastal plain province, and forms one of the nation's most important sources of lumber for building purposes. Pork and poultry, rather than beef and mutton, form the meat supply. Mules are more common than horses.

This region is divided into almost equal parts by the coastal plain and Piedmont Plateau, with a smaller mountain area on the northwest border. Over five million acres have been mapped by the Bureau of Soils. The soil types are much the same and have similar adaptation to those found in Virginia, except that cotton occurs here, especially upon the red Cecil series of the Piedmont. The surface is fairly level in the coastal plain, but upon the Piedmont and in the



FIG. 30. Terraces on a farm at Columbia, South Carolina. Note tortuous direction of terraces.



FIG. 40. A farm in the North Carolina hill country. Tenant houses belonging to one landowner.

mountains it is much broken, making it necessary to terrace much of the land on which maize and cotton are grown, to prevent washing. This makes the fields very irregular, since the cultivation is done on contour lines. The plowing and cultivation of the fields with a single mule is common. The Orangeburg series occurs in the coastal plain province, particularly in Georgia, where the Orangeburg sandy loam is the principal peach soil.

While the average size of the farms is not materially different from those of regions previously treated, this region is noted for its large number of farms between twenty and fifty acres,—that apparently being the most popular size for a cotton farm under the economic conditions which prevail there. This, however, does not properly represent the size of individual land holdings, since it is customary for landholders to divide their holdings into small tracts for renting. A landholder will explain his holdings by saying, for example, "I have fifteen one-horse farms and five two-horse farms." The land is really held, therefore, in larger tracts than would be indicated by the figures given at the head of this section.

The summer temperature is modified by the ocean on one side and the mountains on the other, so that no higher temperatures are experienced here than occur over much of the North Central states south and west of the Great Lakes. On the other hand, the winter temperature is much milder, zero seldom being reached except in the mountain areas. Over much of this region, killing frosts do not usually occur between April

1 and November 1. The rainfall is about forty inches over the whole area, above fifty inches over half of the area, reaching sixty inches in parts of the mountains. The rainfall in the summer is especially heavy. The streams are numerous and of good size. There is considerable variation in the healthfulness of this region. The higher portions of the Carolinas are noted for the delightful air and the excellence of the climate, and many other portions of this region are salubrious. Portions of the coastal plain and Piedmont provinces are not generally considered the most healthful, especially for the white population.

The population, 45 per cent of which is colored, is less than one-half as dense in proportion to the area of improved land as is the population of the North Atlantic states. Less than one person in eight lives in cities of 25,000 inhabitants or over. Until the recent advent of truck-growing and fruit-raising, the chief cash crops, being principally cotton and tobacco, have consisted of crops not reaching the consumer directly, and are unique for the high value in proportion to the weight handled. With the exceptions noted, the region does not raise enough of the standard farm crops for local consumption. The general introduction of cotton-spinning in the Piedmont has led to a greater demand for staple food products.

Formerly plantations were often located along the streams with their fertile "bottoms," the farmsteads being so arranged as readily to make use of the waterways for transporting products. The introduction of railroads has brought about a wider distribu-

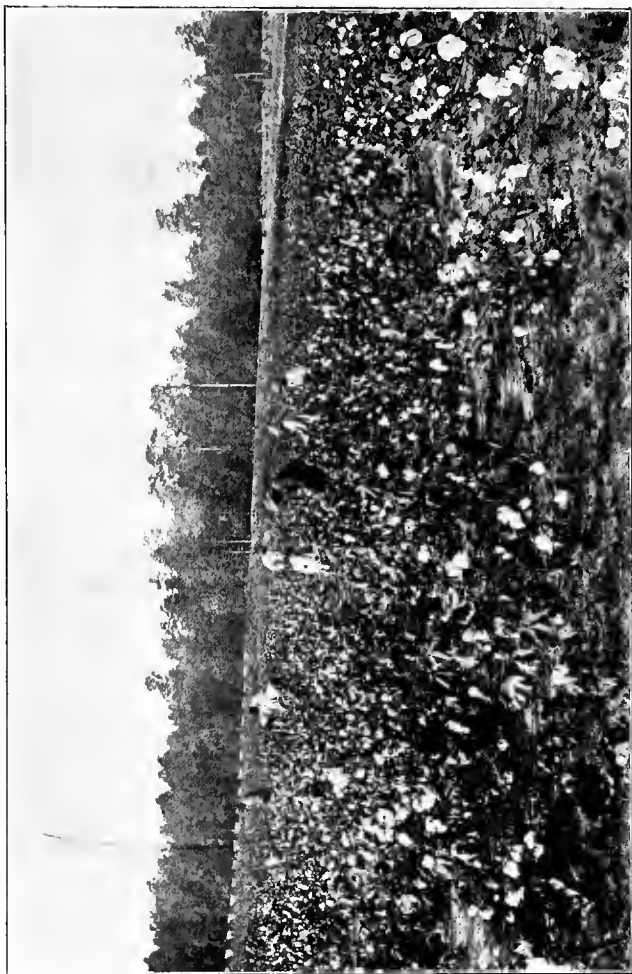


FIG. 41. Picking cotton in Georgia.

tion of the farming area and much less dependence upon the waterways. Excellent plantations are now to be found elsewhere. Railway transportation is rather limited and not of the highest order. In some sections the public highways are in excellent condition, but the contour of the country and other factors usually result in poor roads and make the transportation of farm products difficult.

For economic, climatic and sociologic reasons, the farm improvements are less than in many other regions. The farms contain an abundance of wood. Orchards and vineyards seldom occur except where fruit-raising is a specialized industry. The market value of the farm land is extremely low, the average price being eight dollars. Well-improved land, however, often brings much higher prices. Forty per cent of the farm land is improved. This region contains the largest tenant class of any region in the United States. A little more than 50 per cent of the white farmers own their farms, while less than 20 per cent of the colored farmers are farm owners. Forty per cent of the farming population is colored.

Pastures and meadows are usually poor in this region. Bermuda grass and Japan clover are related to each other in the South, just as Kentucky blue grass and white clover are in the North; and, while they are said to be well adapted to this section, up to this time they have not entered largely into its development. Cow-peas are related to the farm economy of the South in a manner similar to red clover in northeastern United States, although in a less degree.

The lack of domestic animals and consequently the continual cultivation of the land in cotton and maize, and the heavy rainfall during the open winters, all cause the lands to be rapidly depleted, chiefly through erosion. If more of the land could be kept in grass or other forage crops, and economically turned into animal products with the resulting manure, the conditions would be greatly improved. The region exemplifies, in part, the Flemish proverb: "No grass, no cattle; no cattle, no manure; no manure, no crops." The conditions of the region are being greatly improved, however, by the introduction of cow-peas and a more systematic rotation of crops.

Where the Norfolk sand and the Norfolk fine sandy loam are favorably located with reference to transportation facilities, good opportunities exist for truck-farming, while the Orangeburg sandy loam furnishes equal opportunities for peach-growing. The Piedmont is best adapted to the production of cotton and to general farming.

FLORIDA

Population, numbers	528,542
Farms, numbers	40,814
Land area, acres	34,713,600
Area in farms, acres	4,363,891
Improved area in farms, acres	1,511,653
Average size of farms, acres	106.9
Average size of improved area, acres	37.0
Average value per acre	\$9.48

Florida is the only region in eastern United States, with the exception of small areas in Louisiana,

adapted to the growing of tropical and subtropical fruits, which are there produced in great variety. The peninsula is also adapted to the growing of vegetables for northern markets, while the northern and western portions of the state are adapted to the growing of cot-

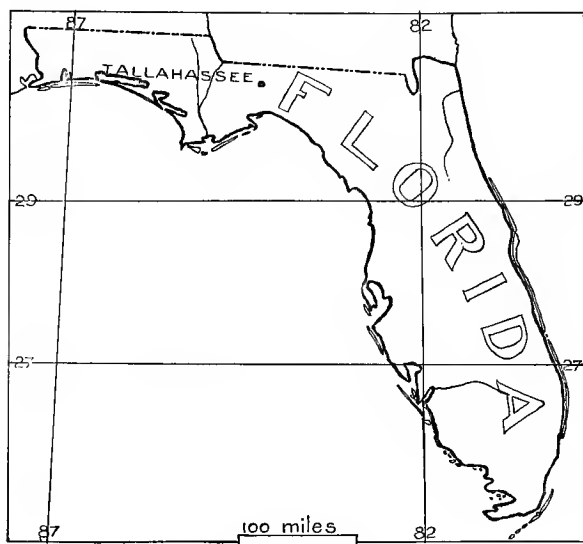


FIG. 42. Florida.

ton, tobacco and sugar-cane. A not inconsiderable number of cattle are reared under practically range conditions, more especially in the southern portion of the state. Much of the area is still heavily forested. The gathering of turpentine and rosin is an important industry.

Nearly one-half the peninsula is less than fifty feet,



FIG. 43. Orange grove on an arm of the Indian River, Rockledge, Florida. Palmettoes ordinarily not so numerous.



FIG. 44. Truck lands along the St. John's River. Digging potatoes at Hastings, Florida.

while almost all is within one hundred feet of sea-level. There is, however, a strip of land extending from Alachua county to Polk county that is somewhat higher. At Lakeland, in the latter county, the elevation is about two hundred and thirty feet. Small lakes abound in the interior of the state.

The soil is generally sandy and not especially fertile, but the humidity of the climate, the high temperature and the abundant sunshine make artificial manures effective. Fruit-growers recognize two classes of land, the pine lands originally covered with pine trees, and hammock lands containing hardwood broad-leaved trees. Much difference of opinion as to which is best, especially for citrous fruits, prevails. On the hammock lands citrous fruits are longer in coming into bearing but are more enduring, while on the pine lands citrous fruit trees are produced more rapidly but are shorter lived. Vast deposits of rock phosphate are found in Florida and South Carolina. The soils and agricultural conditions in western Florida are similar to those of the coastal plain in southern Georgia.

The climate is almost tropical throughout the peninsula, although occasionally frosts damage orange trees severely. The high temperature common in the interior of the continent seldom occurs. Florida is highly regarded as a winter resort. Over much of this area the rainfall is not far from sixty inches, being especially abundant from June to September. In the southwestern portion the rainfall is less than forty inches.

Although one of the first settlements in North America occurred in Florida, this state is largely a

wilderness. Only one-eighth of the total land area is in farms, and only one-third of the latter is improved. The population still shows traces of Spanish occupation; but the white population has been largely increased by the immigration of people from the northern states who have engaged in fruit-raising and truck-farming. The labor is chiefly colored.

There is a narrow fringe of farm land next the eastern seashore which is paralleled by railways. On this strip of land are raised pineapples, citrous fruits, tomatoes and other vegetables for northern winter markets. Between the railroads and the interior it is swampy south of St. Augustine. The west coast is swampy and flat. The larger farming area is in the interior, being devoted to maize and cotton largely in the northern portion, and to citrous fruits and vegetables farther south. Perhaps the most highly developed trucking area is found along the St. Johns River. So far as the land is occupied, the transportation facilities for fruit-raising and truck-farming are fairly adequate. The farm improvements are not generally of a high order.

The average value of farm lands is less than ten dollars per acre, about 35 per cent of which is improved. Large areas still unoccupied can be purchased at a nominal figure. On account of the tropical growth, considerable expense is often required to bring the land into cultivation. Over three-fourths of the white farmers and about two-fifths of the colored farmers own their farms. About one-third of the farming population is colored.



FIG. 45. A bungalow in Dade county. Foreground shows rocky soil characteristic of pine regions in southern Florida

The location of this area with regard to Atlantic seaboard cities is destined to make it an important source of tropical and subtropical fruits and winter vegetables, unless the United States fiscal policy with relation to Cuba should cause a development of trucking and fruit-raising in that island, which may seriously hamper these industries in Florida. The future of Florida is linked with the future of Cuba.

CHAPTER XIV

THE NORTH CENTRAL STATES

OHIO, INDIANA, ILLINOIS

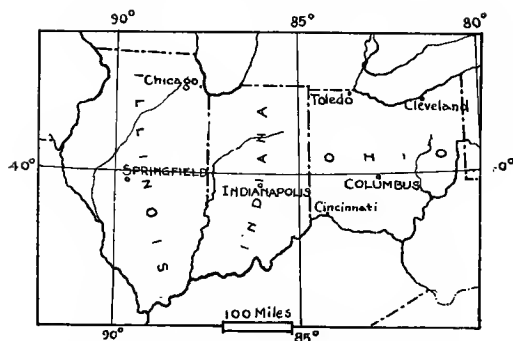


FIG. 46. Ohio, Indiana and Illinois.

Population, numbers	11,495,557
Farms, numbers	762,767
Land area, acres	84,908,800
Area in farms, acres	78,916,336
Improved area in farms, acres	63,624,049
Average size of farms, acres	103.4
Average size of improved area, acres	83.34
Average value per acre	\$44.67

THE three states of Ohio, Indiana and Illinois, with the four immediately west of them, are preëminently adapted to the growth of maize. The ease of cultivation and harvesting consequent upon the friability of the

soil and the levelness of the land, have resulted in an extensive culture of oats and wheat. The distinctive black friable maize lands are largely accompanied with the production of oats and comparatively small quantities of meadow, while the lighter-colored and more distinctly clay soils are used more largely for wheat and meadows. While good pastures and meadows are to be found throughout this region, the area devoted to grass is relatively much less than in the North Atlantic states. Timothy and red clover are the chief constituents of the meadows, while permanent pastures consist mainly of Kentucky blue grass. These three states raise over one-fourth of all the maize and oats raised in continental United States, and about a similar proportion of the winter wheat.

Apple culture is developed along the southern border of this region, while peaches and grapes are raised in considerable quantities along Lake Erie. In southern Illinois, vegetables and small fruits are raised for more northern markets. Considerable quantities of potatoes are raised in different sections.

The eastern portion of this area was originally heavily wooded with moderate-sized deciduous trees of the hardwood species, as white oak, beech, walnut, ash and hickory. The western portion contained large prairies of deep black soil, often requiring no preparation for the plow, although some of the best of it had to be tile-drained before it could be used. The northern portion has supported a large dairy industry, while the central and more southern portions have been devoted to the raising of horses, beef-cattle and swine. The

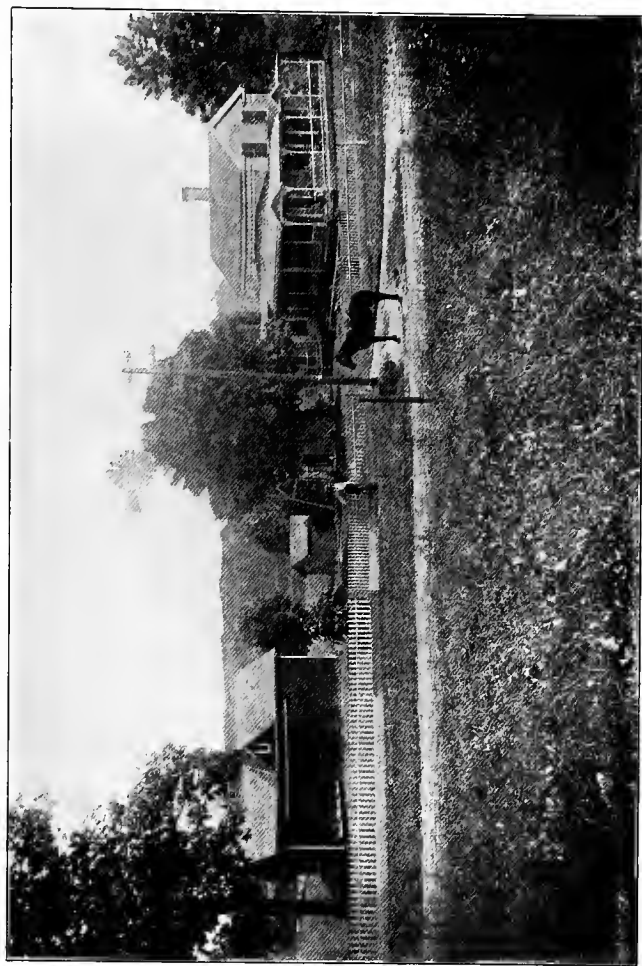


FIG. 47. A northern Ohio farm home.

introduction and development of the draft-horse occurred in this region, and has been a considerable factor in its economic development. In southeastern Ohio fine-wooled sheep have been reared in large numbers. The breeding of pure-bred stock has engaged the attention of many farmers. In southwestern Ohio was developed the Poland China, the most widely distributed breed of swine in America. The rotation of crops and the production of domestic animals in their relation to keeping up the fertility of the soil have probably been as well worked out in this section as in any other region of the United States.

The larger portion of this area is covered with glacial drift. The surface is generally level or gently sloping, except along the terminal moraines on the southern border and in the non-glaciated region beyond, where the surface has been eroded into valleys. In the language of Dr. Orton, there are no hills; there are only valleys. The elevation in southern Illinois is two hundred and ninety feet above sea-level, while at one point (in western Ohio) the land rises above 1,500 feet. The surface of this region, however, is chiefly between five hundred and nine hundred feet above sea level. With the exception of occasional boulders in the more northern portion, the soils of the region are exceptionally free of stone or gravel. The principal soil series are the Marshall and the Miami, although the Dunkirk series occurs next to Lake Erie. The light-colored glacial material occurring on the rolling or level uplands, and the chocolate-colored soils in the alluvial bottoms, or on the second bottoms or

stream terraces, have been mapped in the Miami series; while the Marshall series includes the dark-colored upland soils of the glaciated province. They are distinguished from the Miami series by the larger amount of organic matter and the darker color. The main types in both series are loams, silt loams and clay loams. In general, the Miami series was forested, while the Marshall series was prairies. Considering their extent, their ease of cultivation, and the climatic adaptation of the region in which they occur, the Marshall and Miami series of soil are the most important and most valuable for general farming of any in the United States.

From the standpoint of general healthfulness and comfort, the climate of this region is perhaps not excelled by that of any other equal area. Extremes of temperature, however, are not uncommon, temperatures of 107° Fahr. and —25° Fahr. having been recorded. On the fortieth parallel, killing frosts do not ordinarily occur between May 1 and October 1, although occasionally ten days may be taken off or added to either end of this period. While it is well watered, it is noted for the clearness of the atmosphere and the number of sunshiny days. The average rainfall varies in different sections from about thirty-six to forty-one inches, and is rather evenly distributed throughout the year. In certain sections, dependence upon shallow wells leads to shortage in the water-supply and sometimes to impure water; but there are few farms on which an abundance of good water cannot be obtained at a reasonable depth.

No other equal area on the continent has so little of

its surface unfit for the use of man. Ninety-three per cent of the land area is in farms, while 80 per cent of the land area is improved. This region is the most fully developed, agriculturally, of any equal area in America. Although it contains one-seventh of the population of the United States, it contains nearly six acres of improved land per inhabitant. Chicago is the greatest grain and live stock market in the world. The region also contains more towns of one hundred thousand inhabitants or over than any other region except the North Atlantic states, while Buffalo, Pittsburg and St. Louis are adjacent. Bituminous coal and gas have stimulated manufacturing, and these sources of cheap power have had a favorable influence upon the general prosperity of the people. The local markets are, therefore, of a high class, both for the purchase of supplies and for the sale of farm products.

The farming population, which is almost exclusively white, is most cosmopolitan in origin, being composed of the descendants of the settlers from many of the states of the original thirteen colonies, and also of later immigrants from foreign countries, chiefly the British Isles and Germany. The farm laborers are of the same class, many of them having become farm-owning farmers.

The railway transportation facilities are unequaled. In no equal area in the world are there so many farm homes within a short distance of steam or electric railway. Though generally comparatively level, the public highways frequently become almost impassable at certain seasons of the year on account of the mud,

although in certain sections the main roads have been macadamized or covered with gravel.

Most of the area has been laid out into sections of 640 acres, or a mile square, and the farmsteads occur along the roadway at somewhat regular intervals. As originally settled, a common size of a farm was a quarter-section or 160 acres of land. The average size of the farms in this region, about 100 acres, is much the same as in the North Atlantic states, but the amount of improved land is much larger.

The improvements on the farms of Ohio, Indiana and Illinois, while frequently of a high order, are not generally equal to those of the North Atlantic states, being only about one-half as valuable, in proportion to the total value of the farm real estate. The average value of farm-buildings in this section was, in 1900, approximately \$820 per farm, while in the North Atlantic states the value was \$1,440 per farm. Many farms in Ohio and portions of Indiana still have an ample wood-lot of so-called original or second-growth timber, but much of the prairies, particularly in Illinois, contain only such trees as have been planted, chiefly for shelter. The planting of trees for the production of fence-posts is being promoted. Orchards of apples and other fruit trees, particularly cherries and plums, are to be found upon most farms, although commercial orcharding has caused the decline of the family orchard, due in part, at least, to the inability of small growers to combat insect pests and fungus diseases economically.

This region contains, on an average, the highest-

priced farms of any region in the United States. A moderately well-improved farm sells for \$75 to \$100 per acre. For land especially adapted to maize, the latter is considered a standard price; while much higher prices are paid for land favorably located or having more than average improvements. Not all lands are equally good, however, and there are sections where improved land is not worth more than \$25 per acre, or even less.

The tenant system has become quite common in this region, less than 60 per cent of the farmers owning their own farms. The tenant system usually prevails most largely where the lands are, or at least have been, the most fertile. Where the soil is sufficiently fertile to support two families, the tendency has been for the owner to move to town and rent the farm, share rent being much the most common method in this region. Business men in the cities seeking investments are also likely to buy the more fertile lands. The urban population in this region have large amounts of money invested in farm land, which serves to explain, in part, why the whole population take such a vital interest in the development of agriculture.

This region is destined because of its climate, its mineral and agricultural resources, and the fact that the transportation from the West to the East largely passes through it, to grow rapidly in population. With the disappearance of the free grass regions farther west, the amount of live stock is increasing, which is destined to bring about systems of farm management calculated to maintain indefinitely the fertility of the soil, if, indeed, it does not improve its present condition.

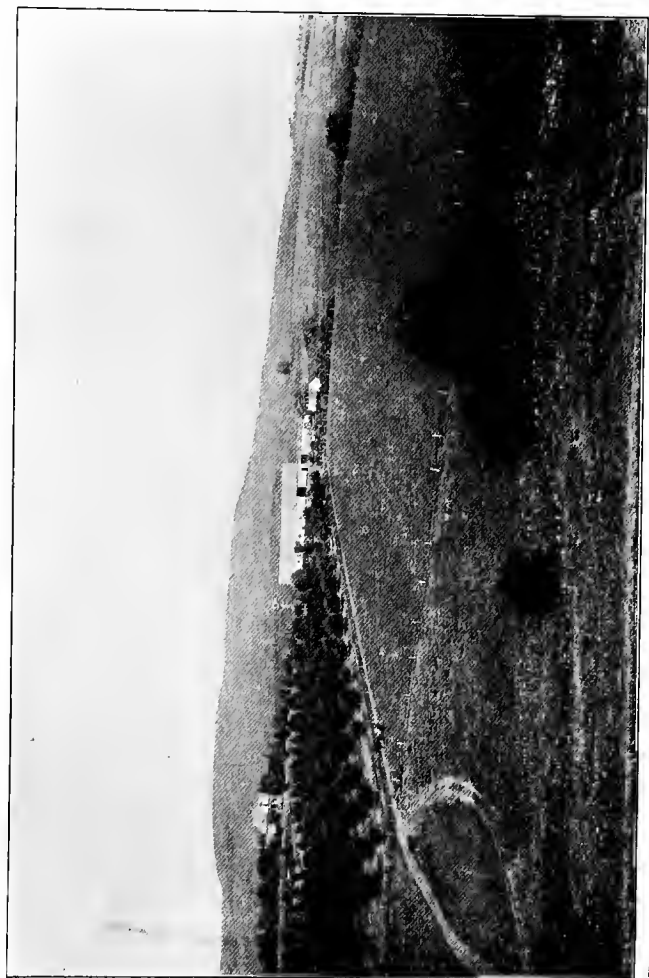


FIG 48. Farm scene near Blue Rapids, Marshall county in northern Kansas. Story-and-a-half-house typical of Kansas and Nebraska.

IOWA, MISSOURI, NEBRASKA, KANSAS

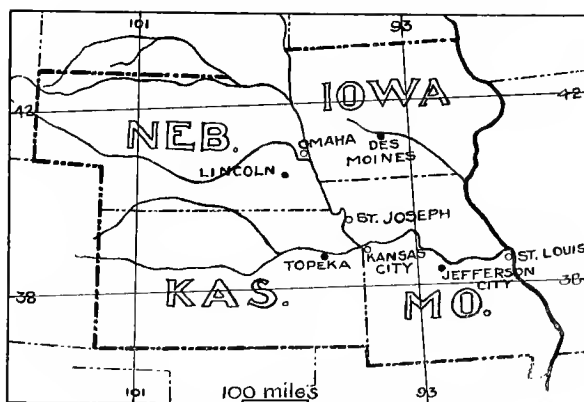


FIG. 49. Iowa, Missouri, Nebraska and Kansas.

Population, numbers	7,875,313
Farms, numbers	808,131
Land area, acres	180,960,000
Area in farms, acres	140,146,959
Improved area in farms, acres	96,270,740
Average size of farms, acres	173.4
Average size of improved area, acres	115.4
Average value per acre	\$24.16

The humid portion of these four states has, in general, the same adaptation to cereal crops as the states of Ohio, Indiana and Illinois. More than one-third the maize raised in the United States is raised in this region. Iowa is better adapted to oats than to wheat, being a little too far north for the best production of winter wheat and a little too far south for spring wheat. Missouri, Kansas and Nebraska are especially

adapted to the raising of hard winter wheat. In general, the best yields of oats in the United States are obtained north of the fortieth parallel of latitude. Iowa raises a not inconsiderable quantity of barley, while Nebraska produces a moderate quantity of rye.

There were some good forests along the Mississippi in Missouri and fringes of woodland along the smaller streams. This is, however, largely a prairie region, and in the more arid section on the west, deciduous trees can be grown only with difficulty, if at all. The government has set aside several hundred thousand acres of sand-hill land in the western portion of this region for the growth of conifers, which have been found to grow in this arid section. The fruit trees are less vigorous and shorter-lived in this region than in the North Atlantic states. The grasses ordinarily raised farther east grow less vigorously, and the pastures and meadows are less permanent. Red clover thrives throughout the humid area, while in the subhumid area alfalfa has become a crop of great importance. Horses, cattle and swine are reared in large numbers, sheep less abundantly.

Throughout Iowa and northern Missouri, the surface is covered with glacial and loess deposits, which give rise to the Marshall and Miami series. In general, the types are similar to those in Ohio, Indiana and Illinois, although perhaps there is a greater preponderance of sandy types in this region. In the western and southern portions of the region the soils are residual, but, except in the Ozark country, give rise to soil types similar in texture to those found in the glaciated region and are



FIG. 50. Scene in the Kansas River Valley, Riley County, Kansas.

usually of great fertility. The region east of Lincoln, Nebraska and Wichita, Kansas, is gently rolling, the hills and valleys being in long swells and depressions, which distinguishes this region from the rolling or hilly country farther east. West of the towns above named the plain rises gently toward the Rocky Mountains. Portions of southern Missouri, including the Ozark Hills, are broken and even mountainous. The pioneer found the soil of the main portion of this region free from stones, free from trees and without immediate need of drainage. He needed only to turn the soil with a plow to convert it into a garden. No equal area in the United States certainly, and perhaps in the world, has ever been developed with such great rapidity.

The land has been surveyed into sections of 640 acres, or one mile square, the roadway and the local market chiefly determining the location of the farmstead. The original settler not infrequently entered upon a section of land, and a half-section was commonly secured. At present, a quarter-section is the commonest sized farm, although half-sections are still not uncommon. The fields are square or rectangular in shape, usually fenced with wire, sometimes with osage orange hedge, forty acres being a frequent size. The use of three large draft-horses in tillage operations is customary.

The climate of this region varies considerably from east to west as well as from north to south, on account of the lesser rainfall and the higher altitude toward the west. The rainfall varies from forty inches or more over a small portion of southeastern Missouri to twenty

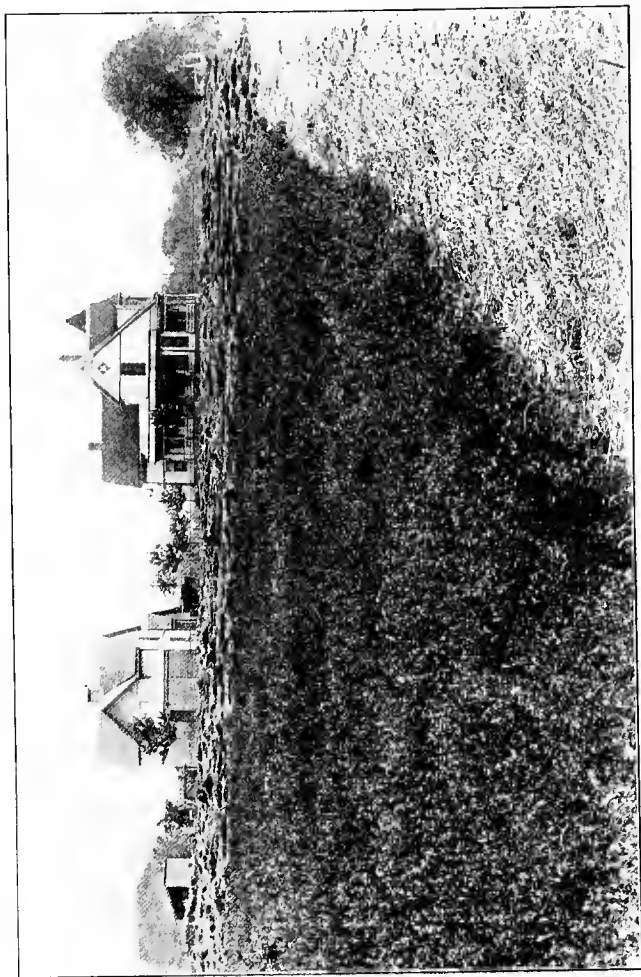


FIG. 31. A farm home in Saline county, Missouri, with a field of alfalfa in the foreground.

inches or less over much of the western half of Kansas and Nebraska. The rainfall decreases imperceptibly from east to west, the dividing line of the mean annual twenty-inch rainfall being approximately the one-hundredth meridian. While the annual precipitation over much of the region is less than thirty inches, the deficiency occurs during the winter months, so that east of the one-hundredth meridian the summer rainfall is sufficient for staple crops, although droughts are not infrequent. Sometimes the securing of water for live stock, and even for domestic use, becomes an important problem.

Extremes in temperature are common, great heat prevailing for many days in the summer and steady cold during the winter. Temperatures ranging from 111° Fahr. to -38° Fahr. have been recorded. Tornadoes sometimes destroy lives and property, and, in the southwestern portion, hot winds do much damage to growing crops. On the whole, the climate is both healthful and cheerful, the clear, dry atmosphere doing much to alleviate the effect of the extreme temperatures.

The area north of the Ozark Hills and east of the one-hundredth meridian has a rather dense agricultural population. Iowa, for example, has the largest amount of improved farm land in proportion to total land surface of any state in the Union. This region produces a tremendous surplus of agricultural products, since there are nearly twelve acres of improved land to each inhabitant. There are few large towns and but little manufacturing, the towns existing mainly to handle

agricultural products and to furnish the inhabitants supplies.

The rural population consists of the overflow from the sections farther east, together with immigrants from the countries of northern and central Europe. The

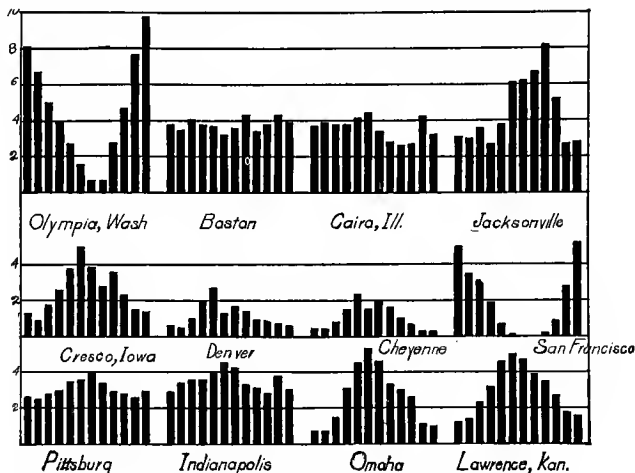


FIG. 52. Types of rainfall in different regions of the United States.

Figures on left show precipitation in inches per month.

close of the war between the states gave the development of this region an impetus, and the consolidation of railroads into transcontinental lines, at about the same time, further promoted this development. This region contains a farming population perhaps as cosmopolitan in origin and with as little segregation along social or religious lines as any important farming section of the United States.

Many farmers in this region possess transportation

facilities second to none in America, especially with reference to "long hauls." Elevators for the economic handling of cereals and provisions for handling live stock abound. Great packing-houses at Omaha, Kansas

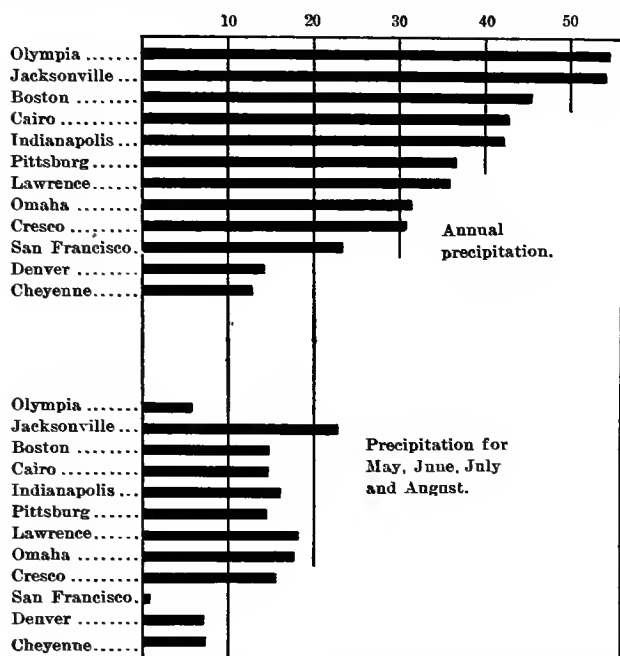


FIG. 53. Chart showing the annual precipitation and the precipitation for four months of May, June, July and August. Note the similarity of the summer rainfall throughout the eastern half of the United States.

City and St. Joseph, and through trains to Chicago give the raiser of live stock a market which is unexcelled. Kansas City is the largest packing and shipping center for poultry and poultry products in America.

The region has the choice of the Atlantic seaboard market via Chicago and the Great Lakes, or the Gulf export markets via Galveston and New Orleans. The public highways have so far received little attention, and, although frequently impassable at certain seasons of the year, are generally excellent for ordinary uses. The planting about the homestead for shelter and for wood gives this region an appearance quite different from those regions where farms have been hewn out of dense forests. Orchards for family use are not uncommon, but commercial fruit-raising is not largely practiced except about Kansas City and in parts of the Ozarks, where a large orcharding center, principally apples, exists.

A comparatively small proportion — one-sixth — of the value of the farms is in the buildings. While the houses are fairly substantial and comfortable, they are often rather bleak and unattractive. The proportion of tenant farmers in this region is very high, cash rent being the most common in Iowa, and share rent in the other three states.

This region has now probably finished its pioneer development, and is no longer open to the seeker for cheap lands out of which to make farm homes, except under irrigation in the western portion, which thus far has not been generally successful, owing to the rather limited supply of water. Since this region contains neither cheap fuel nor other cheap sources of power, and is without extensive mineral deposits, except in the Ozarks, it is probable that the population will not hereafter increase as rapidly as in some other sections.

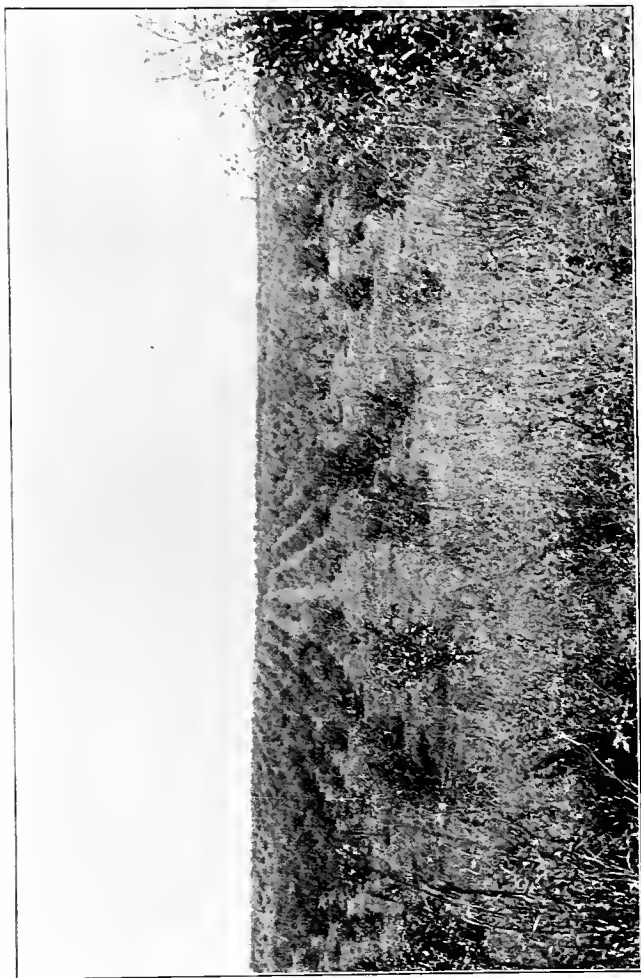


Fig. 54. Portion of an apple orchard belonging to the Ozark Orchard Company, in the Ozark Hills, Missouri.

The Subhumid Region

Although only partially included in the region under discussion, there is an area that needs special mention in this connection. This area may be defined as located between 98° and 104° west longitude, and extending from western Texas into Manitoba and Saskatchewan. This is approximately the area mapped by Dr. Bonsteel as the High Plains province or semi-arid province, but may perhaps be properly called the subhumid region of North America. This subhumid region is 300 miles wide, and between northern Texas and the southern boundary of Canada there is an area of about 330,000 square miles which, owing to a variety of circumstances, has surprisingly uniform agricultural conditions. The average annual rainfall varies from fourteen inches or less upon the west to twenty inches or more on the east. Although, in general, the rainfall is greater in the southern than in the northern portion, the higher temperature, the lower humidity and greater velocity of wind tend to equalize the influence of the rainfall upon crop production. The higher elevation in the southern portion, however, makes the spring and summer temperature of the whole area quite uniform.

Outside the glacial drift, Lyon has divided the soils of the subhumid region into Pierre Shale, Loess, Sand Hill, High Plains and Red Beds. The so-called Loess soil, a light-textured loam of great depth and fertility, probably the product of glacial action, is the most valuable type.

This great area is now largely used for the pro-



FIG. 55. Range cattle in western Kansas.

duction of cattle under essentially range conditions, although this is being gradually modified by the introduction of drought-resistant plants, such as alfalfa, durum or macaroni wheat, emmer (usually called speltz), smooth brome grass and various forms of non-saccharine sorghum and millet, as well as by improved systems of soil management. In the more humid sections of this area, the introduction of the variety of hard winter wheat known as Turkey, and the introduction of more drought-resistant varieties of oats, have done much to improve its agricultural possibilities. The second generation, being to the manor born, will be better able to cope with existing conditions than was the first generation, which had had no experience in "dry farming." There seems to be no doubt that this subhumid region will continue to grow in agricultural importance, although the development will be much less rapid than was that of the area immediately east of it.

MICHIGAN AND WISCONSIN

Population, numbers	4,490,024
Farms, numbers	373,056
Land area, acres	71,603,200
Area in farms, acres	37,424,425
Improved area in farms, acres	23,046,222
Average size of farms, acres	100 3
Average size of improved area, acres	61.7
Average value per acre	\$33.62

Like the North Atlantic states, Michigan and Wisconsin are rather better adapted to the production of foliage than to the production of grain. While maize

reaches its best development only in the southern portions, it is, nevertheless, one of the leading crops of these states. The silo is perhaps more commonly used in these states than elsewhere. The farming is characterized by its diversity, its specialization and the high development of animal husbandry and dairying, meat-production being relatively more extensively followed

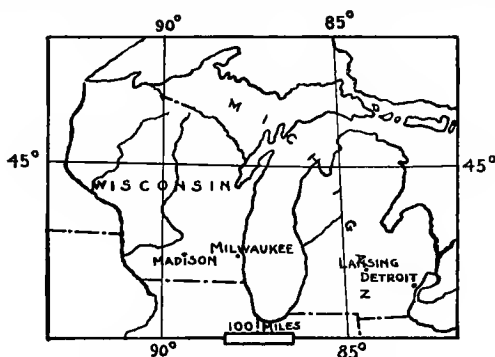


FIG. 56. Michigan and Wisconsin.

in Michigan, and dairying, including the production of cheese for which the state is noted, in Wisconsin.

These states are among the most important producers of peas and white beans. Aside from pasture, the greatest acreage in both states is devoted to hay and forage. Next to this crop, wheat leads in acreage in Michigan, and oats in Wisconsin. In 1900, Wisconsin was the third state in the production of oats and barley, and second in the production of potatoes, with Michigan third. Michigan is one of the leading fruit states in the Union, having in 1900 the largest number of peach

trees, and being a large producer of apples, pears, plums cherries and grapes. The wood cut, in connection with the ordinary farming operations, has a higher value in Michigan and Wisconsin than in any other states except New York. In addition, these states have been among the most important sources of lumber for building purposes, the timber consisting chiefly of white pine and hemlock.

The soils are of glacial drift, with the exception of a small area in southern Wisconsin. Sandy types prevail. The soil is fertile in the southern portions. In the central and northern portions, there are large sandy areas which have not yet been brought into profitable cultivation. The "Jack Pine Barrens" occupy several million acres in Michigan. Areas of muck are of frequent occurrence and are often devoted to special crops, such as celery, onions and peppermint. The surface in the settled farming sections is rolling and generally free from stone; the fields are usually regular and of good size, making cultivation economical. Most of the area being within one hundred miles of the Great Lakes, the temperature is more uniform than in any other equal area of northern United States. The rainfall is between thirty and forty inches and is favorably distributed throughout the year. The southern portions of this area are among the most healthful and delightful in the country.

The relation of population to the improved farm area is similar to that of the three states on the southern border of the region. There is a considerable number of thriving cities and towns within the area. Chicago

is a market for a large quantity of fruit and other farm and garden products. The lumber camp and mill have, in the past, absorbed a considerable quantity of the surplus farm products. The farms are favorably situated with regard to water, steam and electric railway transportation. The public highways are chiefly laid out on section lines. The contour of the surface, the character of the soil and the nature of the climate have made the road problem less serious than in some other sections.

While the earlier settlers were chiefly of native American stock—the overflow of the North Atlantic states—a considerable proportion of the farming population is composed of German and Scandinavian immigrants and their descendants. The farm improvements vary considerably with the character of the soil and the location : in the best farming sections they are of a high order. On an average, the farm improvements constitute about one-fourth the total value of the farm real estate. Having been wooded states, and having a climate adapted to the growth of trees, the farm woodlot is usually ample, as is also the farm orchard.

On account of the large bodies of cheap land in the northern portions of these states, the average price of land is hardly a fair criterion of the price of well-improved land, which in the southern portion compares favorably with any section of the United States. The proportion of farm-owning farmers is high, more than three-fourths of the farms being farmed by their owners. Only about one-half the land area is owned in farms, much of the balance being in timber. The

public good, doubtless, requires that much of this area should continue to be devoted to the growth of timber. Nevertheless, in northern Wisconsin and the Upper Peninsula of Michigan, there are considerable areas of land still open to settlement. The surface is usually level, and in some cases the soil is fairly good. Considerable expense is often required to remove stumps and underbrush. While the seasons are short, the severity of the climate is tempered by the proximity of the Great Lakes.

The adaptation of the southern portions of these states to fruit-raising and to animal husbandry, their transportation facilities and nearness to large markets seem destined to continue the prosperity for which the region has been noted in the past.

MINNESOTA AND THE DAKOTAS

Population, numbers	2,472,110
Farms, numbers	252,613
Land area, acres	144,800,000
Area in farms, acres	60,861,754
Improved area in farms, acres	39,373,088
Average size of farms, acres	240.9
Average size of improved area, acres	155.8
Average value per acre	\$17.90

The farms of Minnesota and the Dakotas have been one large grain-field, consisting of spring wheat, oats flax and barley. Wheat alone constitutes about one-half the value of all farm and garden crops. These three states raise more than one-fourth of all the wheat raised in the United States. Considerable quantities of

cattle and sheep have been raised under range conditions, but meat production has not been largely developed upon farms. Dairying has been developed especially in Minnesota, and, since but little cheese has been made and the local population has required only a small amount of milk, a large surplus of butter has resulted, giving to the state the name of "Bread and Butter

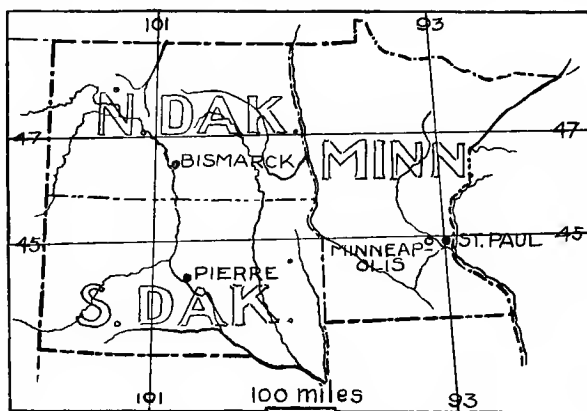


FIG. 57. Minnesota and the Dakotas.

State." The production of draft-horses has been rather extensive. Northern Minnesota has been an important source of hard wood and pine lumber. This state produces more than one-third of all the iron ore mined in the United States.

The soils generally consist of the Marshall series chiefly of the loam types, and in their virgin state are of high crop-producing power where rainfall is sufficient. The soil is usually level or slightly rolling and



FIG. 58. A view of the farming section of southeastern Minnesota.

easily cultivated, although occasionally the boulders of the glacial drift are sufficiently plentiful to interfere with cultivation. This has been the region of bonanza farms, a farm not infrequently occupying several square miles. The owner sometimes plows up the intervening roadways and sows them to farm crops with the rest of the area. Nevertheless, holdings varying from one-quarter to one-half section are the most common. Although the size of the farms is decreasing, this section has the largest area of



FIG. 59. Dakota wheat farm.

improved land per farm of any in the United States. Economy of production, rather than high yields per acre, has been the characteristic of this region. Farm machinery has been developed to use the largest number of horses in proportion to men required in preparing the seed-bed and harvesting the crops. Perfection in threshing and transportation is such that the wheat need not be touched from the time the sheaf is pitched to the threshing-machine until it is made into flour.

The sunshine in summer and the cold of winter are at times very intense, 110° Fahr. and -51° Fahr. having been recorded. The dryness of the atmosphere, how-

ever, mitigates the severity of these conditions. The Dakotas are at a higher average level than any other section east of the Rocky Mountains. The rainfall of Minnesota is between twenty and twenty-seven inches, and that of the Dakotas mostly between fifteen and twenty inches. Like the area farther south, a relatively large amount of this rainfall occurs during the growing months, so that in Minnesota and the eastern Dakotas the moisture is usually ample and sometimes excessive for crop production. On account of the small snowfall in the winter, combined with the low temperature, the ground freezes to great depths.

The region possesses over fifteen acres of improved farm land to each inhabitant, the largest of any region in the country. Aside from St. Paul and Minneapolis, it has few large towns and but little manufacturing. Minneapolis has developed the largest flour mills in the world, which has, in connection with the transportation facilities afforded by Lake Superior, made it a good market for the wheat raised. The internal transportation facilities, while less extensive than in some other sections, are of a fairly high order. The public highways are in much the same condition as those of the states immediately south of this area. The roadways of the Red River Valley are especially bad in the spring.

The farming population of this section has probably a larger proportion of foreign population of recent origin than any section yet described, with the larger proportion from Scandinavia.

The newness of the region, the lack of building material, the character and management of the crops



FIG. 60. A view in the prairie region of Minnesota.

raised and the large size of farms, have made the improvements rather meager when the severity of the climate is considered. While northern Minnesota has extensive forests, the farming section of Minnesota and the Dakotas is a prairie region. In many parts of the latter, trees are grown only by careful husbandry. Nevertheless, considerable quantities of hardy fruits (apples and plums) have been planted in southern Minnesota and in South Dakota.

The region comprising Minnesota and the Dakotas is the least developed, and the land the lowest-priced of any portion of the North Central states. About two-fifths of the land area is in farms, and about two-thirds of this area is improved. There is a considerable amount of tenant farming, share rent being much more common than cash rent. There are still 2,000,000 acres in Minnesota, 7,000,000 in North Dakota and 10,000,000 acres in South Dakota open to settlement under the government land laws, and the railroad companies have land for sale in this section. The work of the United States Department of Agriculture in introducing semi-arid plants, as durum or macaroni wheat, seems especially applicable to the Dakotas, and will doubtless lead to a further development of this section. The diversification of crops and the greater development of animal husbandry are a part of the future of this section. It is not probable, however, that the region will be the seat of a large urban population. The farmers must probably continue to sell the larger part of their productions beyond the borders of the section.

CHAPTER XV

THE SOUTH CENTRAL STATES

KENTUCKY AND TENNESSEE

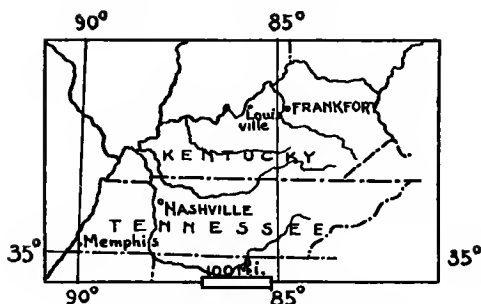


FIG. 61. Kentucky and Tennessee.

Population, numbers	4,167,790
Farms, numbers	459,290
Land area, acres	52,320,000
Area in farms, acres	42,321,480
Improved area in farms, acres	23,987,918
Average size of farms, acres	92.3
Average size of improved area, acres	52.2
Average value per acre	\$15.29

KENTUCKY and Tennessee occupy a transitional position between the North and South,—not far enough south for the best development of cotton and too far south for the best development of the small cereals,—although Tennessee raises considerable quantities of

cotton, and in both states wheat is an important crop. Maize constitutes one-third the value of all farm and garden crops. Next to maize, tobacco is the most important crop in Kentucky, as it is also in portions of Tennessee, notably in the Greeneville and Clarksville districts. Hay and forest products occupy an important place in both states. Hemp, in Kentucky, and peanuts, in Tennessee, are important crops. Pastures are good on the residual limestone soils. The Blue Grass region of Kentucky, extending southward across two-thirds of middle Tennessee, has been famed for three-quarters of a century for the high character of its live stock, light horses and beef-cattle particularly (more recently dairy cattle), and for the general prosperity of the farming community. Meat production, rather than dairying and breeding of mules, has engaged the attention of the farmers of both states. Important beds of phosphatic rocks occur in Tennessee.

The soils are residual and thus variable in crop production, but, on an average, are not equal to the drift soils in the states immediately north. The soils belong mostly to the residual limestone valley and upland and the Appalachian Mountain and Cumberland Plateau provinces, and, so far as yet studied and mapped, include principally the Hagerstown and Clarksville series in the former, and the De Kalb series in the latter. The De Kalb series is the most productive, Hagerstown loam being the principal type in the Blue Grass region of Kentucky, probably not surpassed in fertility elsewhere in the United States. Much of the surface is broken and, in the eastern portions,

mountainous. Careful management is frequently required to prevent erosion.

While there are some large estates, usually the farms are small and the fields irregular in shape. The proportion of improved land is not high. About four-fifths of the land area is in farms, of which less than two-thirds is improved. In view of the topography, the region must be considered largely occupied. While the climate is temperate, it is warmer in summer and colder in winter than the states (Virginia and North Carolina) equally disposed on the Atlantic coast. The rainfall is abundant, varying from forty to more than fifty inches, and is rather uniformly distributed throughout the year, although drought periods are not uncommon during the early autumn months. The region is generally healthful. Comparatively little shelter has been required for live stock.

While there are only two towns of over one hundred thousand inhabitants and no city of the first class, the region is as densely populated in proportion to the improved area, but not the land area, as Ohio, Indiana and Illinois. The surplus products have been less than those of the North Central states. Many communities have required but little from the outside, and furnish but little to it. The transportation facilities compare favorably with those of the other southern states, but are not equal to those of the North Atlantic and most of the North Central states. Because of the steep grades and the heavy rainfall, the roadways are apt to be poor, although in the central portion a fine system of roadways has been constructed. Aside from the towns

within its own area, the principal markets are Cincinnati and New Orleans, or by way of these cities, although Chicago and St. Louis are important trade centers for this region.

About 95 per cent of the farms of Kentucky and 85 per cent of those of Tennessee are farmed by white farmers, while 82 per cent of the whole population is white. The population is largely the descendants of the original settlers of a century ago, who came from the states farther east or from the British Islands. The agricultural and social conditions of the central portion of both states are superior to either the eastern or western portion, the mountainous east being the least developed. The improvements vary from the large colonial mansions "surrounded by lawns and gardens, shaded by groves of handsome trees and approached by well-kept roadways," to "the cramped one-story quarters of the tenant along the highways." On an average, the farm improvements constitute one-fourth the value of the farm real estate, and, on the whole, probably excel those of most other southern states.

These states were originally densely forested, except in the western portion, where this woodless area is now known as "The Barrens." Ample quantities of the best hardwoods remain for farm uses and also furnish a moderate proportion of the cash income. The fencing is of great variety, including stone, hedge, rails and wire. Orchards composed chiefly of apples and peaches are common, and commercial orcharding is increasing. While the average price of land here is much less than that north of the Ohio River, it is greater than in any

other section of the South. The average value of \$15 per acre does not give the proper idea of farm values; well-improved farms upon the better types of soil sell for from \$50 to \$125 per acre, the latter price being not infrequently exceeded in the Blue Grass region. While there are, practically speaking, no new lands, much of the farming area is open to improved methods of farming, while the equable climate and general healthfulness of the section are favorable to settlement. For a century this section has had an important part in the agriculture of the country, and there seems to be nothing in the natural or economic conditions to prevent its continuance.

ALABAMA, MISSISSIPPI, LOUISIANA

Population, numbers	4,761,592
Farms, numbers	559,992
Land area, acres	91,712,000
Area in farms, acres	49,985,290
Improved area in farms, acres	20,915,951
Average size of farms, acres	89.2
Average size of improved area, acres	37.3
Average value per acre	\$8.54

The crop adaptation, development and present agricultural condition of the region under consideration are similar in most respects to that of the Carolinas and Georgia. Cotton and cottonseed constitute more than one-half, and maize meal nearly one-fourth the value of all soil productions. In Louisiana, the production of sugar, and, to some extent, rice along the Mississippi River bottoms has occupied the planters from the

earliest times, while recently the application of modern labor-saving machinery has resulted in an extensive development of the rice crop in the prairies in the southwestern part of the state.

Truck-farming has engaged the attention of a number of farmers favorably located for the shipment of early fruits and vegetables to Chicago and other large

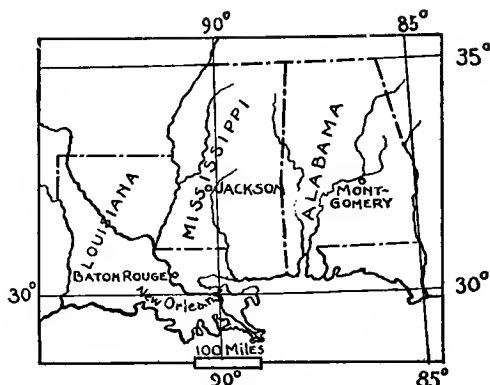


FIG. 62. Alabama, Mississippi, Louisiana.

cities of the North Central states. The shipment of strawberries begins in lower Mississippi in April, and during the main season the point of shipment moves northward at the rate of about thirteen miles a day. Nut-culture is being developed in parts of Mississippi and Louisiana, while nursery-growing is an important industry in northern Alabama. The most important timber reserves in the country are in these states and form the basis of a large industry. While swine and poultry have been widely raised for home consumption,



FIG. 63. A sugar plantation on the Mississippi River south of New Orleans. Picture taken from boat.



Japan clover field.



Cowpea field on sandy lands of northern Louisiana.



Rice field on prairie land in southwestern Louisiana.

FIG. 64. LOUISIANA FARM SCENES.

the quantity of live stock raised is small and the quality is poor.

The coastal plain extends farther inland than along the Atlantic seaboard. Indeed, this soil province reaches through Mississippi, Louisiana and Texas into Tennessee and Arkansas. The coastal plain, however, is cut into two parts by the flood plain of the Mississippi River, which occupies a large area in Louisiana and Mississippi. As its name indicates, the flood plain of the Mississippi is subject to overflow at more or less regular intervals. This has resulted in building up a ridge of land next the river which is naturally sufficiently drained to be cultivated; while the lower lands, farther from the river, consist mostly of timbered swamps and are uninhabited. The principal soil type of this province, Sharkey clay, locally known as "buckshot" soil, is, when properly drained, said to be a soil of the highest productivity. The possibility of draining this soil is now exciting public attention. Shaler estimates that the undrained swamps bordering upon the Gulf of Mexico aggregate about 30,000 square miles, and contain the largest and the most valuable reserves of high grade land in the United States.

The Norfolk and the Orangeburg are the principal soil series of the coastal plain, and the different types have similar crop adaptation to those in the states farther east. In the western part of Louisiana is found a series of soil with a high percentage of silt and a low percentage of sand, which, when irrigation is possible, is especially adapted to rice culture. The Crowley silt loam is the most important type for this purpose.

While there are in this region nearly 3,000 farms of over 1,000 acres, averaging nearly 2,000 acres, the average farm area is the smallest of any region in the United States. The commonest-sized tenant farm is between 20 and 50 acres, while at least one-sixth of all the tenant farms are under 20 acres. This is due to the fact that so many of the renters rent just enough land, 20 to 25 acres, for one animal to cultivate. The plantations, or landholdings, however, average much larger than would be inferred from the census. The average holding in the black belt of Alabama and Mississippi is possibly 300 to 500 acres, and from 120 to 200 acres in the other counties of these states.

The temperature never goes below ten below zero, seldom below zero, and freezing temperature is rarely maintained for more than twenty-four hours even in the northern part of the area, while on the southern border the climate permits the culture of subtropical fruits. Owing to the ease with which the wind may sweep down from the north, changes in its direction from north to south cause sudden alterations of temperature in winter. The summer temperature is not so high as in most of the North Central states, but the greater humidity of the atmosphere makes it more oppressive. The rainfall throughout most of the region is about fifty inches, and in the southern portion exceeds sixty inches.

A considerable area of gently rolling land of high fertility is known as the "black belt" and is largely occupied by Negroes, which has given rise to the impression that the region was named from the population



Fig. 65. Farm scene in northern Louisiana.

instead of from the soil. The lowlands near the water-courses are not generally considered healthful for whites. Doubtless a greater knowledge of necessary sanitary precautions, the location of residences some distance from swamps, and the screening of doors and windows to prevent the entrance of the night-flying, malaria-bearing species of mosquitos will lead to an improvement of the conditions of life.

The water-supply is usually abundant and good in all regions except in the Mississippi Flood Plains. In the prairie regions of Alabama and Mississippi, artesian wells to a depth of 300 to 600 feet supply excellent water for many plantations. Where these are not present, cisterns are cut in the rock and filled with rain-water. In and near New Orleans, wooden cisterns above ground are customary. Because the water-table is so close to the surface, vaults are universally used for burial in New Orleans.

These three states have a land area somewhat larger than Ohio, Indiana and Illinois, with less than one-third the improved farm area, and with a little more than one-third the population. Only one town in the district (New Orleans) contained as many as 40,000 inhabitants in 1900, and probably no other has as many as 50,000 at the present time.

The chief cash crops, cotton and sugar, have a high value for the weight transported. Of staple northern crops, meats and dairy products, the region does not raise enough for home consumption. The railway facilities are similar to those in the South Atlantic states. The Mississippi River has been an important means of

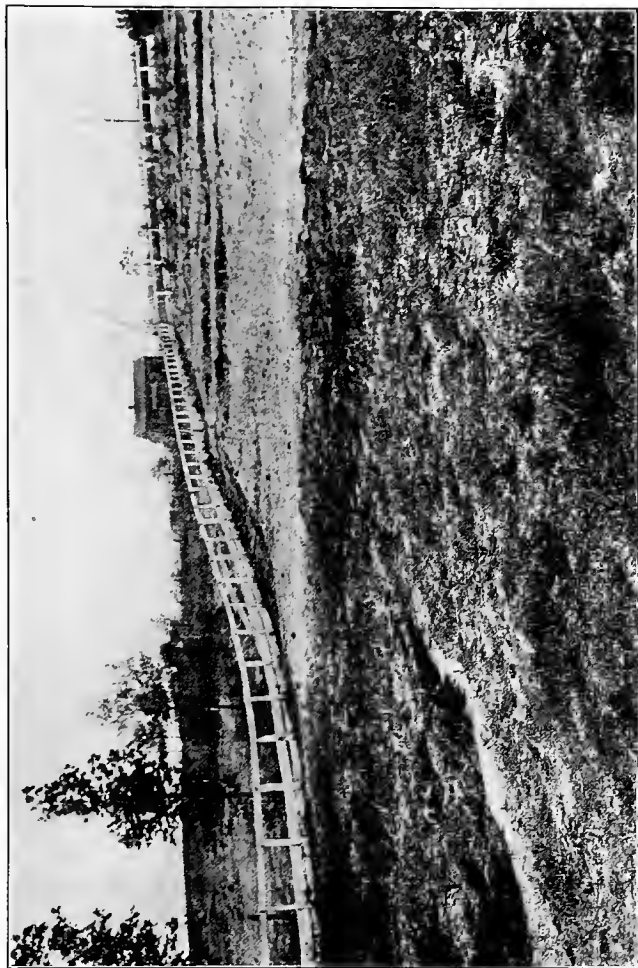


FIG. 66. A farm and tenant house in southern Alabama, afterward purchased for Tuskegee Institute.

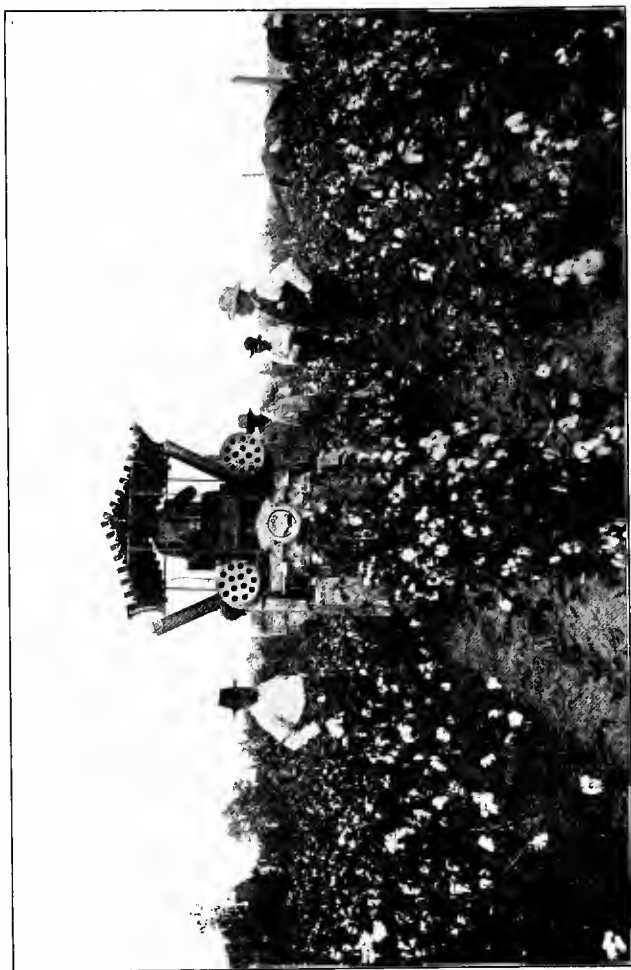


FIG. 67. Mechanical cotton-picker operating in Louisiana cotton-field.

transportation for the larger plantations along its shore, while New Orleans is one of the important seaports of America. The highways are usually poor and irregularly disposed.

While the larger plantations have not infrequently extensive steadings, as a rule the farm improvements are meager. Wood is abundant, and moderate amounts of fruit are raised for home consumption. Farm values are low, the average price being less than nine dollars. About 40 per cent of the land is improved. The tenure among the whites is similar to that in the North Central states. The tenant¹ system, however, prevails among the colored farmers, less than 15 per cent owning their farms. Cash² rent is rather more common than share rent. A system of crop liens prevails, the crops often being mortgaged to their full value before maturity. Rather more than half the farmers, as well as half the population, are colored.

Like the South Atlantic states, this region suffers from the lack of grasses and forage crops adapted to the soil and farm methods, and the consequent lack of animal husbandry. Cow-peas have somewhat helped this situation, and alfalfa has been found to succeed in some sections, especially in the prairie region (limestone soil) of Alabama and Mississippi and in the Red River

¹"Tenant on shares.—If the farm is cultivated by a tenant who pays for its use a share (as one-third, one-half, or other proportion) of the crop raised, write 'share'." (Twelfth Census of the United States, Vol. V, p. 759.)

²"Cash tenant.—If the farm is cultivated by a tenant who pays a fixed rental in money or a stated amount of labor or farm commodities (not a proportionate share of all) write, 'cash'." Ibid.

Valley in Louisiana. The one-crop system has been the rule. Cotton requires less labor to raise it than to pick it. The result has been that a large number of persons have been supported in idleness most of the year in order to have sufficient help when cotton is ready to pick. The introduction of a successful machine for picking cotton would make a great change in the economic conditions of this region.

With the cutting of the forests, new lands of good fertility are being opened to settlement at an extremely low price. The ease with which underbrush grows in this moist, warm climate may make the preparation of the land for cultivation an expensive undertaking. The region has good deposits of coal and iron, which are leading to more manufacturing, a more rapid growth of cities, and a greater demand for farm products. The building of cotton factories is also proceeding rather rapidly. This region, therefore, offers opportunities for further agricultural development.

ARKANSAS, OKLAHOMA, INDIAN TERRITORY

Population, numbers	2,101,955
Farms, numbers	286,694
Land area, acres	78,640,000
Area in farms, acres	39,625,058
Improved area in farms, acres	15,527,922
Average size of farms, acres	138.2
Average size of improved area, acres	54.1
Average value per acre	\$7.72

These states are grouped together because of geographical convenience rather than because of physio-

graphical or agricultural unity. The coastal plain province extends from Louisiana into Arkansas on the east; the Ozark Hills extend from Missouri throughout western Arkansas and are followed by other hills through the southern portion of Indian Territory into Oklahoma. The western portion of Oklahoma is similar to northern Texas, while in the northern portions the conditions are similar to those in southern Kansas. In

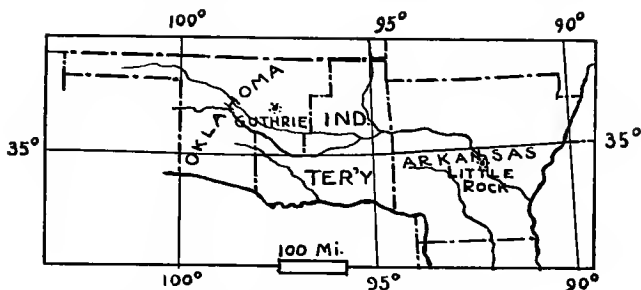


FIG. 68. Arkansas, Oklahoma, Indian Territory.

Arkansas and Indian Territory corn (maize) and cotton are the chief farm crops. In Oklahoma wheat is as important as maize, while cotton is relatively less important. In parts of Oklahoma broom-corn has become an important crop, while in other parts the raising of "new" potatoes for northern markets is an important industry. Cattle-raising is relatively important throughout the whole region. The forests are extensive, of great variety and large size in the eastern portion of the area, while the western portion is prairie interspersed along the streams with a rather scanty growth of timber of the hardwood varieties.

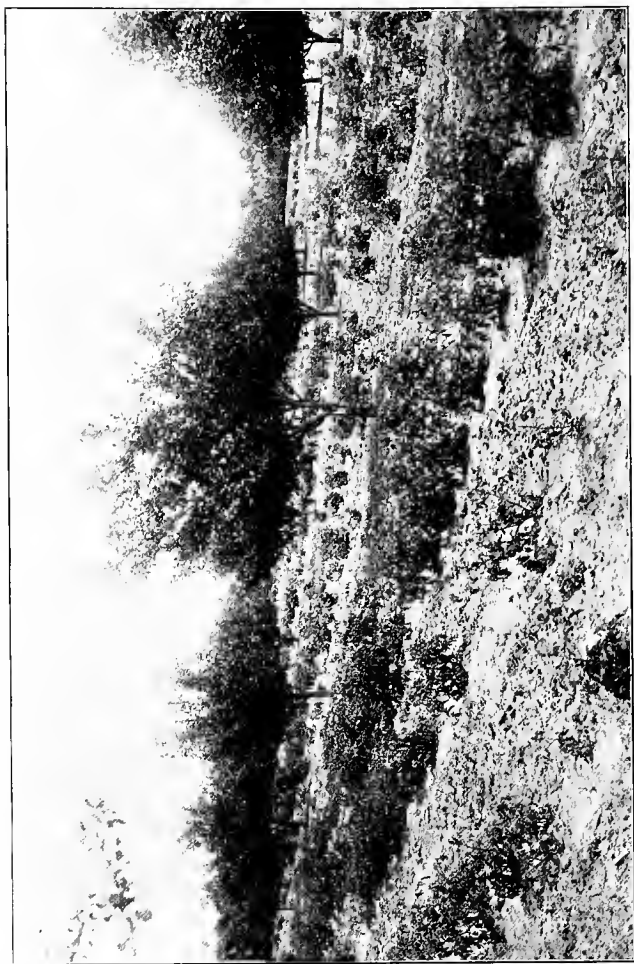


FIG. 69 Apple orchard with tomatoes in Indian Territory.

The surface of this area and the soils are correspondingly varied. Along the waterways the alluvial soil is of extraordinary fertility in Arkansas, but in Oklahoma is apt to be too sandy and, in places, alkaline. The upland plains and rolling hills are covered with a residual soil of moderate fertility. When devoted to cotton, the soil is rapidly exhausted by erosion, owing to the exposed surface and open winters, especially in Arkansas. The temperature and rainfall are much the same as in the similarly disposed states to the south. The annual rainfall is between forty and fifty inches in Arkansas, between thirty and forty in Indian Territory and eastern Oklahoma, between twenty and thirty in central Oklahoma, while in the Panhandle on the west the rainfall is below twenty inches. With the exception of the extreme western portion, the region is well watered.

While the agricultural conditions of Arkansas are similar to those of the Mexican Gulf states, the farming methods are, perhaps, the most primitive of the older settled sections. The agricultural conditions of Oklahoma are similar to those of Kansas. Although the area was not opened to settlement until 1889, it is now well developed and its agriculture is thoroughly modern. It had formerly been a part of Indian Territory and, when opened to settlement, was about the only piece of prairie land in the humid area that had not been developed. The result has been that it has developed with great rapidity. In both Arkansas and Oklahoma there are still more than two million acres
.. of public land open to settlement.

"The land in Indian Territory is held by the several Indian nations, but the title is being gradually extinguished and transferred to citizens. To assist in accomplishing this end is the present work of the Dawes Indian Commission. Under the decisions, and by the direction of that commission, land is being allotted in severalty to the citizens of the various nations; and, while the citizens may not alienate their holdings by sale, they may legally lease the lands to others for agricultural purposes. As a consequence, the allotted lands are more commonly cultivated by those to whom they have been leased than by those to whom they are allotted. These renters, who constitute the greater number of cash and share tenants reported, are principally white men."¹

Northern settlers in Arkansas have found some difficulty in becoming accustomed to the climatic conditions, but, when acclimated, have become moderately prosperous. To secure adequate returns from investments, due regard must be given to the conditions of farm labor. "The greater portion of the land remaining unappropriated (in Oklahoma) is best fitted for grazing purposes, as much of it is either hilly and rough, sandy, covered with saline or gypsum deposits, or rocky and unfit for cultivation. A considerable portion is situated above an altitude of 2,500 feet and has a consequent small rainfall. This portion of the country is chiefly devoted to live stock interests, as the native grasses are very nutritious and supply pasturage during the entire year."²

¹ Twelfth Census of the United States, Census Bulletin No. 186, p. 3.

² Report of the Secretary of the Interior, 1904, p. 149.

TEXAS

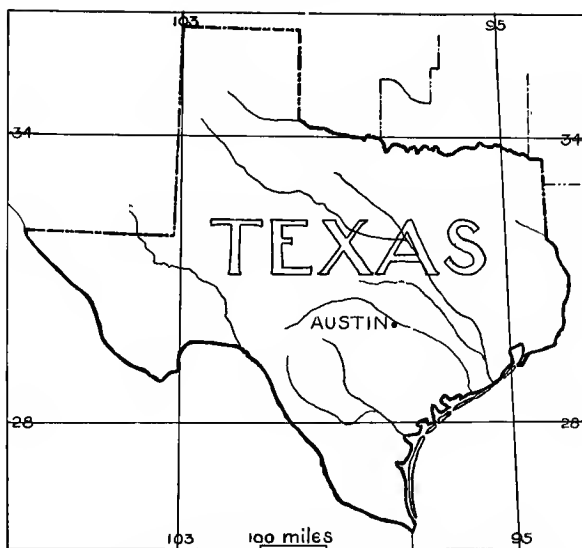


FIG. 70. Texas.

Population, numbers	3,048,710
Farms, numbers	352,190
Land area, acres	167,865,600
Area in farms, acres	125,807,017
Improved area in farms, acres	19,576,076
Average size of farms, acres	357.2
Average size of improved area, acres	55.5
Average value per acre	\$5.49

Texas is an empire in extent, far exceeding the combined area of the North Atlantic states. It ranges in height from sea-level on the east to five thousand feet above sea-level on the plains of the west. The annual

rainfall varies from fifty or more inches on the east to fifteen inches or less on the west. It extends through nearly ten degrees of latitude. Its soils are varied. It has, therefore, a varied crop adaptation. Nevertheless, at present, its main soil products are not unusual in variety. Cotton and cottonseed constitute more than one-half and maize more than one-fifth of the soil products, pasture excepted. In the Panhandle, kafir corn and milo maize are raised as grain crops. In Texas, the pasture is an important consideration, since one-eighth of all neat cattle in the United States is found here. At present it is the most important source of young cattle to be fattened. Eastern Texas is the seat of a large and increasing lumber industry. Fifty to one hundred miles inland from the Gulf the region is not heavily timbered. While East Texas has been largely devoted to general farming, at the present time a considerable development in fruit-growing and truck-raising is taking place.

The state may be divided into three regions: the coastal plain in the east bordering the entire state along the Gulf; the prairie region in the center, and the Great Plains in the west. The soils are residual, with considerable quantities of rich alluvial soil. The surface is generally level or rolling. The soil is usually free from stone and easily cultivated. What is known as the "black land belt" is a prairie region extending from the Red River on the north to the Rio Grande on the south. "This belt, which is almost exclusively an agricultural region, has an average width of less than 100 miles and a length of about 400 miles.



FIG. 71. Cotton planted in March after onion crop was harvested. La Grange, Texas.

It includes such cities as Paris, Dallas, Waco, Austin and San Antonio, and supports a large proportion of the state's population, as well as contributing very largely to its wealth."¹ The Houston black clay, known locally as "black waxy" land, and Houston clay, known as "tallow-ridge" land, are perhaps the strongest and most important types for general farming.

The average size of the farms is large and the average improved area is small. Averages give little idea, however, of actual conditions. More than one-third of the farms are less than fifty acres, with over 90 per cent of the area being improved, which is exceedingly high. On the other hand, over 88,000,000 acres, or more than half the land area in the state, are owned in about 11,000 ranches, or an average of 8,000 acres per ranch, with only 2.5 per cent of this area improved. In other words, cotton farms here, as elsewhere, are small, while the ranches are large. In the other states the public lands belong to the United States Government. When, however, the United States Government acquired Texas from Mexico in 1845, the state retained title to the unappropriated lands. The laws of the state of Texas have made it possible to acquire large bodies of land for ranch purposes, which the land laws of the United States have tended to prevent in other states. This has doubtless been one of the factors in developing the cattle industry in Texas.

No statement will hold for all parts of this large region with such a varied altitude and rainfall. In

¹ U. S. Dept. of Agr., Field Operations of the Bureau of Soils, 1903, p. 556.

general, however, while the growing season is much longer and the winters milder, ten below zero Fahr. not having been recorded in most sections, yet the maximum temperature is not greater than in the states similarly disposed farther north. The rainfall near the coast is characterized by wide annual monthly variations, thirty inches having been recorded in a single month, while at other times merely a trace has fallen. Violent wind-storms and marked electrical disturbances are not uncommon. The precipitation is sufficient for the needs of successful agriculture in the eastern third of Texas, but from the one hundred and first meridian westward the rainfall is uncertain and ordinarily insufficient for the staple farm crops. Irrigation is practiced somewhat in the arid region in the drainage basin of the Rio Grande and Pecos rivers, and also in the humid section in southeastern Texas, where rice has been developed contiguous to the rice belt of Louisiana. The acreage under cultivation, however, is small compared to the Western states.

The water-supply for domestic and livestock purposes is ample in most parts of the state. Bright, clear, running water is available in a considerable portion of the state, although in some sections it is muddy or murky. Where there are foot-hills, there is spring-water. Artesian water is available in some sections, notably the district surrounding San Antonio to the southeast, and also near Waco. In general, the well-water supply is ample at from ten to seventy-five feet in depth. In some portions of East Texas, the quality is rather poor, but generally throughout the state it is

good. Very little of the water of the state is affected by alkali.

Although the population is the sixth in the Union, it is yet small in proportion to the land area, or the area in farms and ranches. The population is not, however, much smaller in proportion to improved farm area than the average of the United States. The wooded sections are sparsely settled, the timber rights of much of the forested land being owned by lumber companies. As yet, Texas is largely a rural population and has, therefore, but little local market. It has, nevertheless, several important business centers. Galveston has become one of the most important export cities in America, and Fort Worth has become the center of an important packing industry. The principal cash crops are cotton and cattle. Cattle are not only, like cotton, a product of high value for weight, but they can also be moved with ease long distances to shipping points.

Although the railway mileage is low in proportion to land area, it is high in proportion to population, and in the aggregate is one of the largest in the United States. The transportation facilities must, therefore, be considered well adapted to the needs of the state. The highways are but little improved, and, although meeting the needs of the population fairly well in summer, considering the crops chiefly raised, they are frequently difficult to travel. In some counties, however, good macadam roads have been constructed. Much of the land has not been carefully surveyed and the roadways are not laid out with the same regularity that is cus-

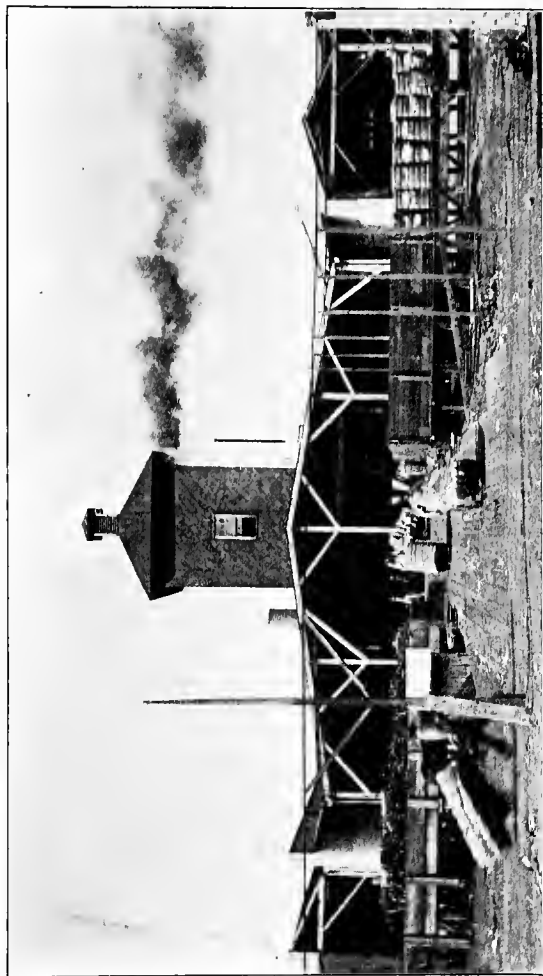


FIG. 72. Cotton compress, Houston, Texas.

tomary in the North Central states, where the sale of public lands is under the supervision of the National Government.

Owing to the large holdings in ranches devoted to stock-raising, the average value of the improvements is low. The average value per acre of the buildings upon farms and ranches was, in 1900, 80 cents in Texas, \$14.89 in the North Atlantic states, \$2.94 in the South Atlantic states, \$5.35 in the North Central states, \$1.59 in the South Central states and \$1.79 in the Western states, while the average for the United States was \$4.23. The improvements in the cultivated sections are much better than would be expected by the figures just given.

The larger portion of the black land belt has good homes, though the outbuildings are not attractive. The "post-oak" country presents a contrary condition, with few exceptions. Tenants sometimes occupy tents while producing a crop. The Plains country generally has good homes with poor outbuildings. Texas may be said to have entered upon a period of home-building. Well-built cottages are taking the place of the historic Texas shanty. On account of the climate, attention is first given to the dwelling and then to the outbuildings. Considerable tracts of woodland occur in East Texas, but elsewhere wood is scarce, and fencing is an important problem met usually by the use of barbed wire.

The population is perhaps more cosmopolitan than in any other southern state, except, possibly, Oklahoma. There has been some immigration from northern Europe and from all parts of the United States, prob-

ably the older North Central states furnishing as large a proportion of the population as any section. About one-fifth of the total population is colored.

The average value of the farm land is extremely low, but when the small improved area is considered, it seems less so. The tenant system is surprisingly prevalent. About one-half the farms, although not nearly one-half the farm area, is managed by tenants, share rent being much the most common system. In addition, one-third the farm area of the state is operated by farm managers, 2,560 such ranches, with an average of 16,400 acres, being thus conducted.

The public domain of Texas was, in 1900, still greater than the total land area of New England. There is much land open to settlement at from three to ten dollars per acre. It frequently cost, however, ten dollars per acre to clear such land and get it ready for cultivation. Truck- and fruit-farming have proved successful on the appropriate types of the Norfolk and Orangeburg series in the coastal plain province. Kansas City, St. Louis, Denver and Chicago are within easy reach of the important trade centers of Texas. At present, Chicago is thirty-three hours from Dallas, and Kansas City is twenty-two hours from Fort Worth. The live stock has, up to the present time, been raised principally upon the native grasses, while comparatively little live stock husbandry has been practiced in the cultivated section. Sufficient dairy products are not raised to meet local demands. To what extent the cultivated grasses will succeed in this area is yet to be shown. Sorghum and millets

are adapted to the state for forage purposes, and cow-peas and alfalfa are said to have a wide range. Compared to its present condition, Texas probably has as large a future for agricultural development as any other section of the country. In the minds of some, no other part of the country offers equal opportunities for settlement and the investment of capital.

CHAPTER XVI

THE WESTERN STATES

THE Western division, composed of eleven states and territories, occupies more than one-third the land area of the United States exclusive of Alaska and our insular possessions, and, in 1900, contained 5.5 per cent of the population. This region can be described, in a word, as one of high altitude and low rainfall, although there are some notable exceptions. In southern California, Salton Desert, which has recently been partially transformed into a lake, is, in places, three hundred feet below sea-level. In western Washington, the annual rainfall is more than one hundred inches. Most of the arid portion of the United States lies in these eleven states and territories under consideration; comparatively little of it has thus far been found adapted to dry farming.

When the pioneer first crossed to the Pacific coast, he found this region moderately well covered with nutritious, although scanty, grasses, which, in the arid climate, cure into nutritious hay without cutting, thus making good pasturage at all seasons, when not covered with snow; provided enough area be left per animal, which is usually estimated roughly at twenty to thirty acres per cow or steer. Since it was largely prairie or open woodland, and unfit, without irrigation,

for homesteads, it has been extensively used for the production of cattle and sheep and less extensively for horses. The laws relating to the acquirement of the public lands were not such as to make ownership of this land economically possible for grazing, the only purpose to which the most of it was adapted. If, however, a person acquired title to the approaches to the water-supply, he was able to control all the region,



FIG 73. A familiar range scene, Western United States.

often of large extent, within the sphere of such supply. As long as there was plenty of room, men respected each other's possession of territory, to a certain extent, although there was no ownership of land.

Beginning about 1875, there was a tremendous increase in the number of cattle and sheep, which resulted in overstocking, about a decade later, at least so far as cattle were concerned. Since that time, sheep have been gradually crowding the cattle off the ranges,

because they require less water, can subsist on herbage that will not support cattle, and because, in passing over an area herded in flocks, they make the region unfit for cattle. The sheep not only eat the pastures too close for cattle to subsist upon them, but in many cases they have destroyed ranges, making regions where the forty-niner found the grass knee-high barren wastes. It has been demonstrated that, in some cases, at least, these regions will make a natural recovery in time, if grazing is prohibited; but, without legal possession, there has been little incentive to proper management of these vast resources.

In the decade from 1890 to 1900, sheep have increased in the Western division 50 per cent. While the number of cattle has decreased two and one-half millions, the number of sheep has increased seven millions. The live stock industry, as a whole, therefore, has somewhat declined. More than one-half the sheep of the United States are to be found at present in this section, and about one-eighth the cattle,—less than the number in Texas, where the law has permitted the fencing of the ranges. Iowa contains more than one-half, and Iowa and New York together nearly as many cattle as this western third of the United States. The conditions growing out of the free use of the public land have led to much lawlessness and to many conflicts, especially between cattle and sheep owners. Although probably the salvation of the live stock industry in the end, in this country, the occupation of the land by actual settlers, who generally become irrigators, has added to the difficulties of the large

owners of cattle and sheep. The settler not only located upon the best land next the source of water, but also sought to use the range for the pasturing of his stock, which led to conflict between the ranchman and the settler. Furthermore, settlement was not always bona fide, but for the purpose of "rustling" cattle from the ranches.

The partial decimation of the free grass ranges has led to numerous serious problems, not the least of which have been legal, concerning the reclamation of the arid region. In general, it is sought to meet the situation by the introduction or improvement of drought-resisting plants where dry farming is possible, by a better control of the source and use of water, by a closer interdependence between the irrigated areas and the grazing areas, and by national and state legislation better suited to an arid region.

In the spring, upon the melting of the snow in the mountains, many of the streams become raging torrents; while when most needed for the growth of crops, they may become nearly or quite dry. Something has already been done by private enterprise to store water in order to regulate the supply. In 1902, an act of Congress provided that the proceeds from the disposal of public lands be used in building reservoirs and canals for irrigation purposes, and providing for the subsequent sale of the water rights, and the land thus developed to reimburse the government for the money expended. Twenty-three million dollars had accrued to the end of the fiscal year 1904 from the sale of lands in thirteen states and three territories, and projects of



FIG. 74. Native grass on range, in western United States.

a more or less definite character are under way for the expenditure of twenty-seven million dollars involving the reclamation of one and one-third million acres in these same states and territories. It is not intended to irrigate lands which may produce crops by dry farming in ordinary years. No project is considered feasible in which the return of funds is not guaranteed.

One of the difficulties in the development of the arid region has been the fact that our legal jurisprudence has been adopted from humid countries, which, while suited to the development of the eastern part of the United States, is unsuited to the arid region. Not only is the common law inadequate to meet the situation, but our own national and state laws have, in the past, been made to fit humid sections. In humid sections titles to land are all-important, while in arid sections water rights become more important than ownership of land. Not only have rights to water been ill defined under common and statutory law, but in this country, the National Government owned the land, while the state controlled the water.

"Wherever water and land are owned apart from each other, there is a tendency to create monopolies in water, and to place the tiller of the soil at the mercy of the owner of the stream. The natural, if not inevitable, result of our land system is to create such separate ownership and such speculative abuses. No industrial problem of the West equals this in importance. The institutions now being created will, in time, affect a population greater than that of the entire nation. The customs, which are the outcome of primi-

tive conditions, will harden into laws, and abuses will become vested rights. No adequate system of irrigation laws, or any enduring prosperity for the people who till the soil, can be built on separate ownership and divided control of land and water. The fundamental condition of success is that these two joint agents of production should be disposed of together, and that with every title to irrigable land should go an interest in the stream which gives it value."¹

Particularly distressing situations have arisen where the water-supply ran from one state into another. Many questions connected with the use of water need to be considered before purchasing land for irrigation, the laws and customs concerning which vary with the states. The whole problem is intricate and outside the scope of this book.²

Lands under irrigation have, in some instances, lost their crop-producing power through excess of soluble salts, or by seepage from the irrigation of lands on higher levels. Where once there were fertile and improved farms and populated communities, the deadly alkali has gradually destroyed the crops, and the area has reverted to a barren waste. Under-drainage has been proposed as a condition necessary to complete and continued success of irrigation under these circumstances. The amount of land under irrigation, while not inconsiderable in the aggregate, is small, compared to the total body of land, and will continue to be so after

¹ Elwood Mead: "Irrigation Institutions," p. 23. 1903.

² See "Irrigation Institutions," by Elwood Mead. "Irrigation," by F. H. Newell.

the government has finished its reclamation projects made possible through the sale of public land. The present area under irrigation is between seven and eight million acres; while it is estimated that if the water resources were completely developed and wisely conserved, about ten times this amount, or an area somewhat greater than the present farm area of the North

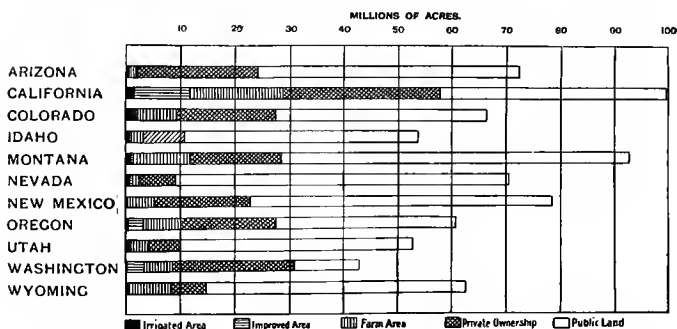


FIG. 75 The relative size of eleven arid states and territories, with the area in private ownership, farm area, improved and irrigated acreage.

Atlantic states, could be irrigated. Such a development, however, can be brought about only after many years of costly effort.

President Roosevelt, in his first message to Congress, stated: "In the arid region it is water, not land, which measures production. The western half of the United States would sustain a population greater than that of our whole country today, if the waters that now run to waste were saved and used for irrigation." The great interest that the President has manifested in the development of this section, and his own personal knowledge

of existing conditions, have undoubtedly had an important influence in increasing the forest reserves, in establishing reclamation projects, and in a better execution of the laws. Doubtless this great section will receive an impetus from such beneficent measures, and will open new opportunities to settlers. The intending purchaser of land, however, should remember that this is no longer a pioneer country. That this section will subsequently support a population of many millions of people is, no doubt, true; but this must come about through internal development, just as in other sections of the United States.

One difference in crop adaptation is worthy of special note. In the other two-thirds of the United States maize is an almost universal crop, and usually, grass excepted, the dominant one. In the western third of the United States, this characteristic American crop is almost totally absent. That only one bushel in five hundred is raised in this area does not necessarily signify, since the area under cultivation is small. Its scarcity may be shown by comparison with other staple crops. This division raises about one bushel in sixty of oats, one bushel in twenty of wheat, and more than one bushel in four of the barley raised in the United States. The experience in growing maize by irrigation is such as to lead to the belief that the development of the arid section will not extend the production of maize, which, if true, is a fact of considerable significance. The two crops that receive intercultural tillage during their growth and which may enter into the rotations in the place of maize are potatoes and sugar-beets.

MONTANA, WYOMING, COLORADO

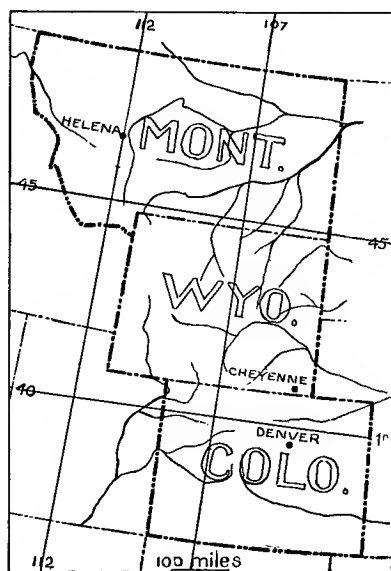


FIG. 76. Montana, Wyoming, Colorado.

Population, numbers	875,560
Farms, numbers	44,165
Land area, acres	221,779,200
Area in farms, acres	29,443,578
Improved area in farms, acres	4,803,001
Average size of farms, acres	666.6
Average size of improved area, acres	108.8
Average value per acre	\$6.64

It may be questioned whether the country is sufficiently developed for the statistics of present production to be a guide to the crop adaptation. Vast free grass

ranges have stimulated the grazing of cattle and sheep, and this, in turn, has stimulated the growing of hay and forage crops with which to help in wintering herds of cattle and sheep. Seventy per cent of the area in all crops is in hay and forage. In Colorado one-half of this area is in alfalfa, but as we proceed northward the proportion of alfalfa to total forage crops decreases somewhat rapidly. While the balance of the area is devoted chiefly to wheat and oats, a not inconsiderable amount of potatoes, other vegetables and fruits is raised. The sugar-beet industry has developed rapidly in recent years.

Thus far the soil has proved fertile wherever water could be obtained, and the presence of injurious salts either in the soil or water has not prevented the growth of crops. The character of the water rather than the character of the soil must be carefully considered in the selection of a farm site.

This region is about equally divided between mountain area and plains. In general, the plains are on the east and are from less than 3,000 to more than 8,000 feet above sea-level; while the mountains rise to 15,000 or more feet, the higher peaks being perpetually covered with snow. Among the mountains at an elevation of 7,000 to 8,000 feet are found a number of green parks, once the basins of lakes, which make excellent pastures and are easily cultivated when irrigated. The lands selected for irrigation, being comparatively level and free from stones, are easily cultivated. Eighty per cent of all lands raising crops in this area is irrigated. The percentage under irrigation is considerably less in Mon-

tana than in Wyoming or Colorado, since in the former the precipitation is greater, especially in the western portion, where considerable dry farming is practiced. In general, however, the annual precipitation for the whole region is between ten and twenty inches.

This is a region of great extremes in temperature, -63° and 110° Fahr. having been recorded. While high temperatures are recorded, they are usually of short duration and the nights are usually cool. The western portion of Montana is rather more equable than the rest of this section. In general, the shortness of the season and the lowness of the temperature at the higher altitudes constitute a menace to the maturing of crops. While the climate is rugged, it is one of extreme healthfulness. The climate and, perhaps, the food and water tend to produce domestic animals of excellent vigor.

The total area in farms, about one-eighth of the total land area, gives but little idea of the agricultural activity, since large areas of government land are used for grazing. It is estimated that about 60 per cent of the land area is suited for grazing, and it is generally conceded that it is already overstocked. About 35 per cent of the total land area is more or less densely covered with timber, about one-fifth of which has been reserved. Forests of commercial importance cover about one-half this area. The rest of the timber is woodland of great value to the settler, but of little commercial importance. The trees of the Rocky Mountain region differ from those of the eastern United States in the much greater proportion, as well as greater number, of coniferous species. They differ from those farther east and

on the Pacific coast in that they cast less shade and are thus less dense, at least in appearance. As their name indicates, the mountains are rocky and the growth of trees is not such as to hide the surface. The probabilities are that this area would not reforest itself as readily as the natural forest lands do in the Atlantic coast and Mexican Gulf states, which emphasizes the importance of the forest reserves that the Government has made in order to insure the future supply of water and wood.

Only about one acre in fifty is improved land, and about one-half this area is irrigated. It is estimated by Newell that the water-supply is sufficient, if wisely used, to irrigate an area about equal to the present area in farms. Less than thirty-five hundred persons or corporations own over twenty million acres of land, or over two-thirds the total area owned in farms. Nevertheless, the most common-sized farm is between one hundred and one hundred seventy-five acres. The average holding of irrigated lands is about fifty acres.

This region has a land area twice that of the North Atlantic states and a population less than that of Connecticut. Although the land area is very large in proportion to population, and although, Denver excepted, this area has no city of more than thirty thousand, nevertheless, the percentage of non-agricultural population is largely due to the extensive mining industry. The mineral resources are extensive and varied, consisting of gold, silver, copper, lead, tin, iron, coal and salt. The area in crops other than hay is not large in proportion to population; and it may be doubted whether, aside from meat, the region produces sufficient food on the whole

for local consumption. This section depends to a considerable extent upon canned goods shipped from without, although much of these supplies could be raised by irrigation. The population is largely native-born Americans come from the North Atlantic and North Central states, and who, as a class, are energetic and resourceful. A number of Indian reservations occur in Montana and Wyoming.

The railway mileage is small, although it is large in proportion to population. It is still not uncommon to be located fifty or even one hundred miles from a railway station. The railway mileage is being rapidly extended. The transportation facilities which exist are of a high order and generally adequate for the livestock industry.

Where cattle-raising is practiced, it is necessary to have a fixed habitation, and this results in ranches frequently with improvements of a high order. The sheep industry, however, is largely nomadic. Sheep are herded in large bands by herders who may live constantly in a camp wagon. By this means one man, by employing sufficient herders, may own thousands of sheep without any permanent improvements and even without owning any land. This condition is being rapidly changed.

There are still in this region approximately one hundred and thirty million acres of unappropriated and unreserved land, eighty-two millions of which have been surveyed and are therefore ready for entry. This land is, for the most part, fit only for grazing except where irrigated, although durum or macaroni wheat and



FIG. 77. Part of Bitter Root Stock-farm in Montana. Creamery in the foreground.

other drought-resisting plants have extended the non-irrigated cultivated area somewhat.

The irrigated areas are widely scattered, being developed near streams, which are numerous, this area being the source of three of the greatest river systems in the United States,—the Colorado, the Columbia and the Missouri. The most extensive and highly developed areas are to be found along the South Platte in north-eastern Colorado and along the North Platte in south-eastern Wyoming. These two branches and their tributaries, along with water taken from the main Platte in Nebraska, constitute the source of the largest irrigated area in the United States. That part of Wyoming which is being most rapidly developed by irrigation at present is along the Big Horn and Wind rivers, in the central part of the state. The irrigation laws in Wyoming and Colorado are perhaps the most satisfactory of any of the states or territories, and offer the settler the greatest security for his labor.

There are five reclamation projects under way in this region which, it is estimated, will reclaim an aggregate of about one-half million acres when fully completed. The Uncompahgre project, obtained by a diversion of the Gunnison River, is located near Montrose and Delta, Colorado. The Shoshone project, which will develop an area of 175,000 acres on both sides of the Shoshone River, is located about seventy-five miles east of the Yellowstone National Park in Wyoming. The Huntly project is located in southeastern Montana between Huntly and Bull Mountain.¹ The North Platte project,

¹ Appendix, page 390.

located in southeastern Wyoming and western Nebraska, will be made by storing the flood and surplus waters of the North Platte River in an immense reservoir made by constructing a dam 210 feet high in a narrow cañon of the stream, just below the mouth of Sweetwater River in Wyoming. The Lower Yellowstone project is designed to irrigate 66,000 acres in northeastern Montana and northwestern North Dakota. All five projects will have some land open to homestead entry.¹

The average value of the land owned in farms, \$6.64 per acre, must be considered rather high when it is remembered that the land is now used only for grazing. The high value of irrigated land, which constitutes about 10 per cent of the land owned in farms, helps to increase the average price. The average value of irrigated lands exclusive of buildings was given by the Census of 1900 approximately as follows: Colorado, \$40; Montana, \$20, and Wyoming, \$16. The best irrigated lands suitable for growing alfalfa are valued at from \$50 to \$150 per acre, while in some instances irrigated orchards have a reported value even as high as \$1,000 per acre. A comparatively small number of the farms are operated by tenants. There are, however, in addition to the farm land just mentioned, six and one-half million acres of state land rented for grazing purposes at an average value of less than ten cents per acre. A combination of leased grazing land with the ownership of a small irrigated area is believed to bring the most satisfactory results. The development in the future will probably be along these lines.

¹ Appendix, page 390.

UTAH, NEVADA, NEW MEXICO, ARIZONA

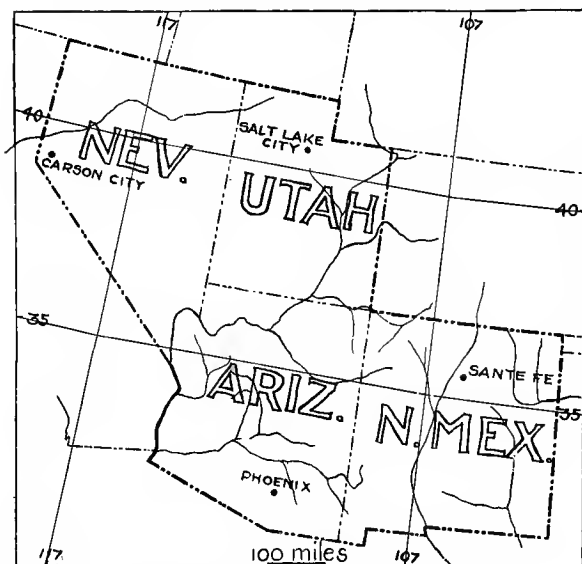


FIG. 78. Utah, Nevada, New Mexico, Arizona.

Population, numbers	637,325
Farms, numbers	39,691
Land area, acres	273,478,400
Area in farms, acres	13,748,813
Improved area in farms, acres	2,186,457
Average size of farms, acres	346.4
Average size of improved area, acres	55.0
Average value per acre	\$7.38

The vast region in southwestern United States covered by these four states is the most arid and therefore the most undeveloped of any in the United States.

This includes, also, the hottest region in the United States, 110° Fahr. not being an uncommon summer temperature throughout much of this area and 119° Fahr. having been recorded. About one-half the area has an annual precipitation of less than ten inches. Perhaps not less than fifty million acres are, indeed, a desert unfit for man, and supporting but comparatively little vegetable or animal life. Nevertheless, this area, like the preceding one, supports a large cattle and sheep industry. About one-half the area is suitable for grazing. It is estimated that less than 10 per cent is covered with forests of commercial importance; while perhaps 15 per cent more contains open and scattered woodlands of value to the stockman and settler.

Except for fruit-raising and sugar-beet culture, which are rather extended in proportion to farm area, the cultivated land is largely an adjunct to stock-raising. More than one-half the area in crops is in hay and forage, more than one-half of which is alfalfa. Next to hay, the principal crop is wheat. Eighty-five per cent of the area in crops is irrigated. Less than one acre in two hundred is irrigated at the present time. It is estimated that about one acre in twenty-five could be irrigated with proper management.

It is difficult to describe briefly the physiographic features of this region, so as to give a proper conception of the agricultural conditions and possibilities. The Rocky Mountain range divides Utah and Arizona from New Mexico and Colorado. The high plains of Texas extend through New Mexico, where they are broken by Rio Grande and Pecos rivers which have

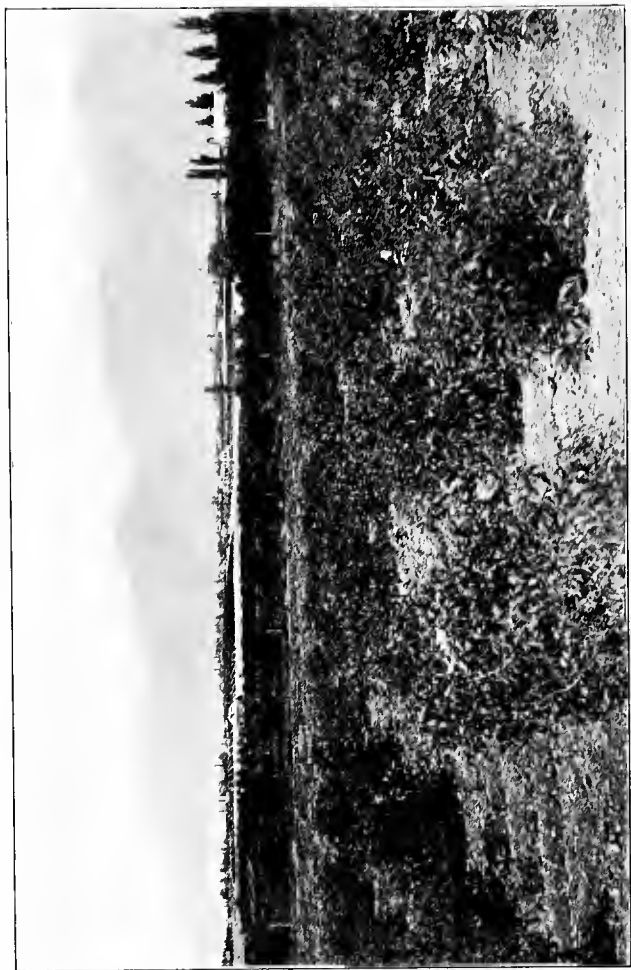


FIG. 79. Tomatoes and peach orchard at Brigham City, Utah. Tomatoes and peaches are canned extensively.

furnished few large irrigation enterprises, but supply water to many small communities. New Mexico is therefore almost exclusively devoted to grazing. Eastern Utah and northern and western Arizona are included within the drainage system of the Colorado. The Colorado and its tributaries cut the plateau into deep cañons, making it generally impossible to irrigate and resulting in land of slight value. In southern Arizona, the Gila and Salt rivers offer opportunities for irrigation which were used by prehistoric races. "Without irrigation this part of Arizona is a semi-tropical desert; with irrigation it is capable of sustaining a dense population, limited only by the water-supply that can be secured by ditches, reservoirs and wells and by the wisdom shown in the distribution of water thus obtained."¹

Nevada and western Utah are included in the Great Interior Basin. This region, once the bed of a great lake, has no outlet, the mountain streams being lost in the sands of the plains. This basin slopes from north to south, being four thousand to six thousand feet above sea-level on the north and east, and below sea-level at places upon its southern border. "But the Great Basin is by no means a single broad valley or desert. On the contrary, it is broken by irregular mountain masses which rise abruptly from the nearly level plains. These plains are, for the most part, the bottoms of ancient lakes in which thick deposits of gravel, sand and clay have accumulated, burying the bases of the mountains. There are two great systems of these ancient lakes, that on the east including what is left of

¹ Census Bulletin 68, p. 12.



FIG. 80 Mouth of Logan cañon in Cache Valley, Utah, showing flat bottom land, flat benches and irrigation canal.

Lake Bonneville, and that on the west the ancient Lake La Hontan. The Great Salt Lake of Utah is the shrunken remnant of Bonneville, and Lakes Winnemucca, Pyramid, Humboldt, Carson and Walker are depressions in the bottom of old Lake La Hontan."¹

The principal farming region of Utah is to be found on the eastern slope of this Great Basin in the vicinity of the Great Salt Lake; while the most important farming communities in Nevada are on its northern and western ridges. The principal irrigated areas are to be found along the Humboldt, Truckee, Carson and Walker rivers. The agricultural adaptation of the most thickly inhabited portions of Nevada and Utah more nearly corresponds to that of the states immediately north, east and west, and, were it not for geographical lines, would be thus distributed. The major parts of the Great Basin and the Colorado Plateau have but small agricultural possibilities.

The population, less than two to the square mile, is large in proportion to the area under cultivation. In New Mexico and in southern Arizona a considerable proportion of the population is of Mexican origin, not always the most enterprising in developing large agricultural projects. The beneficial influence of the climate in pulmonary trouble has added to the population. The largest Indian reservations are to be found in Arizona. The conditions in Utah have been dominated by the Mormon population, whose religious zeal and genius for coöperation have been suited to irrigation farming. The principal products which have found sale beyond

¹Census Bulletin 187, p. 12.

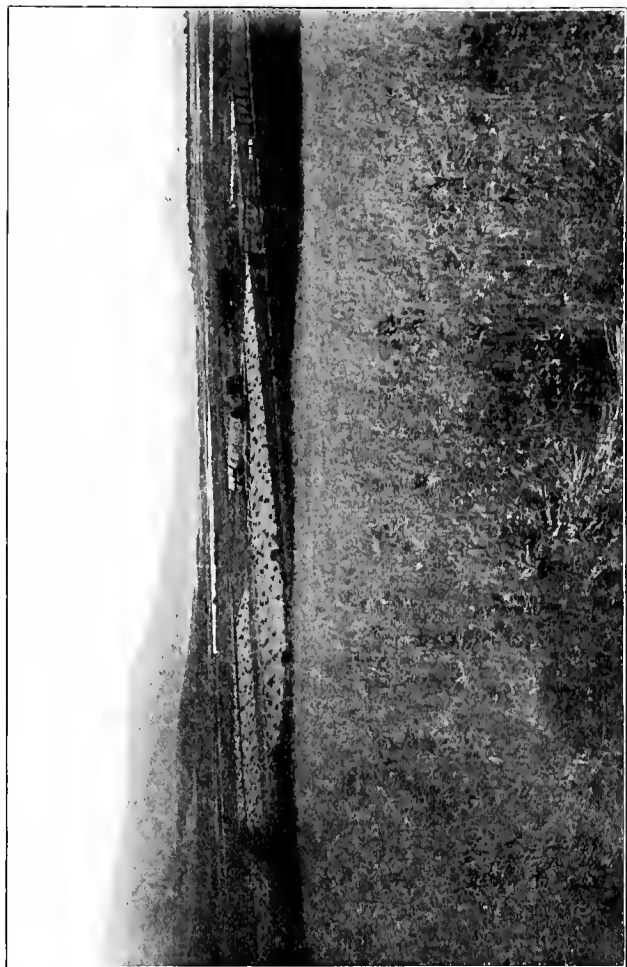


FIG. 81. At the south end of Cache Valley, Utah.

the region have been metals, meats and wool; although western Nevada and northern Arizona have furnished some lumber. This area contains the least railway mileage of any similar area in the United States.

The improvements in some localities, as in the farming region about Salt Lake City, are excellent; but, as a whole, are limited for reasons mentioned in the previous region, and, in addition, because of climate and the traditions of many of the inhabitants. The value of the lands here, as elsewhere, varies sharply with the water-supply, although that is not the only factor. The average value of the irrigated land exclusive of buildings was, according to the census of 1900, approximately as follows: Nevada, \$28; New Mexico, \$29; Utah, \$37; Arizona, \$44. The best sugar-beet and alfalfa lands are valued at from \$60 to \$200 per acre, while lands in orchards are valued still higher.

The value of water rights and of the cost of maintenance varies greatly in this region, as elsewhere. The census of 1900 gives the average cost of the water rights, being the actual first cost of applying the water, as \$2.86 in Nevada and \$9.50 in Arizona; and the average cost per acre of maintenance as eighteen cents in Nevada and eighty-two cents in Arizona and New Mexico. The market value of these water rights is not given. In the case of some of the land, the water right goes with the land; in most of the higher-priced land this is the case. On the other hand, the first cost of the water right is often much higher than the figures given. In several irrigation projects under the reclamation act the cost of the water rights has been established

at \$26 per acre, payable in ten annual instalments without interest. Shares in the Tempe Canal, adequate for watering about a section of land, have brought as high as \$8,000. The major portion of the irrigated lands, however, all over the arid west is supplied from ditches constructed by the farmers themselves at comparatively small expense.

Less than one thousand persons or corporations own nearly ten million acres, or nearly three-fourths of the land owned in farms. Leaving this area out of account, the most common-sized farm in New Mexico and Utah is less than fifty acres, and in Arizona and Nevada, between one hundred and one hundred and seventy-five acres. Very little land is rented.

Seven reclamation projects are under consideration or under way in this region, involving an aggregate of between eight and nine hundred thousand acres of land.¹ In some of these projects, the land is all under private ownership. The Truckee-Carson project in western Nevada, it is estimated, will reclaim 350,000 acres admirably situated with reference to transportation to San Francisco. A portion is public land and may be filed upon in accordance with the rules and regulations of the homestead laws and the reclamation act.

WASHINGTON, OREGON, IDAHO

Population, numbers	1,093,411
Farms, numbers	86,510
Land area, acres	157,267,200
Area in farms, acres	21,775,528

¹ Appendix, page 390.

Improved area in farms, acres	8,207,386
Average size of farms, acres	251.7
Average size of improved area, acres	94.8
Average value per acre	\$15.37

This region is characterized by its immense forest resources, its fishing industries, and the high production of wheat by dry farming in the eastern part of the

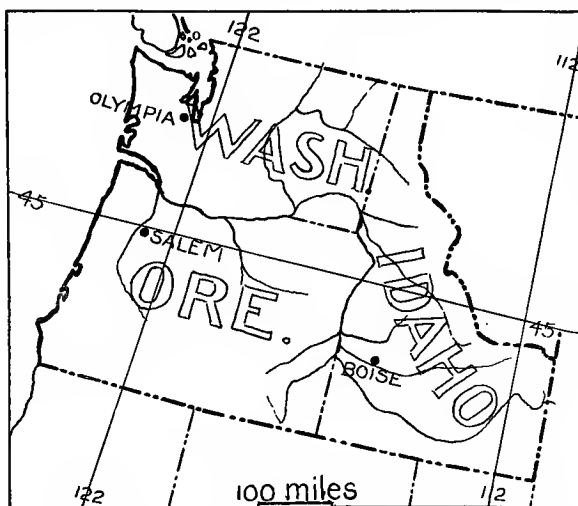


FIG. 82. Washington, Oregon, Idaho.

state of Washington and in the Columbia River in Oregon. One-third the area is covered by forests of immense commercial importance, while at least one-fifth more of the area is covered by trees of less importance. In western Oregon and Washington are to be found millions of acres of the densest forests with coniferous trees of great height and large diameters of which the

Douglas fir and the red cedar are perhaps the most important. It is not uncommon for five acres of land to cut a million feet of lumber. The Government has made forest reservations of about sixteen million acres, or about one-tenth the land area of the region.

Wheat and hay each constitute about one-third the value of all crops. While general farming is somewhat more developed than in the two preceding regions, the grazing of live stock is still one of the principal industries, especially in Idaho and Washington. Certain areas in Washington, Oregon and California furnish ideal conditions of soil and climate for the production of hops. These three states produce two-thirds the product of the United States.

The Cascade Mountains divide this region, climatically and agriculturally, into two parts. The western third of Washington and Oregon has a rainfall varying as one proceeds toward the coast from twenty to one hundred inches. Between the Cascade Mountains and the coast range are fertile, well-watered valleys already thickly populated. The eastern two-thirds of these states and Idaho have an average rainfall of less than twenty inches. The precipitation gradually decreases from north to south until it becomes less than ten inches in southeastern Oregon. The precipitation throughout this region is principally in winter, little rain falling east of the Cascade Mountains during the summer months. Upon the western coast, owing to the Japan current, the temperature is the most equable in North America. The climate is more like that of England than that of any other part of the United States. In the eastern

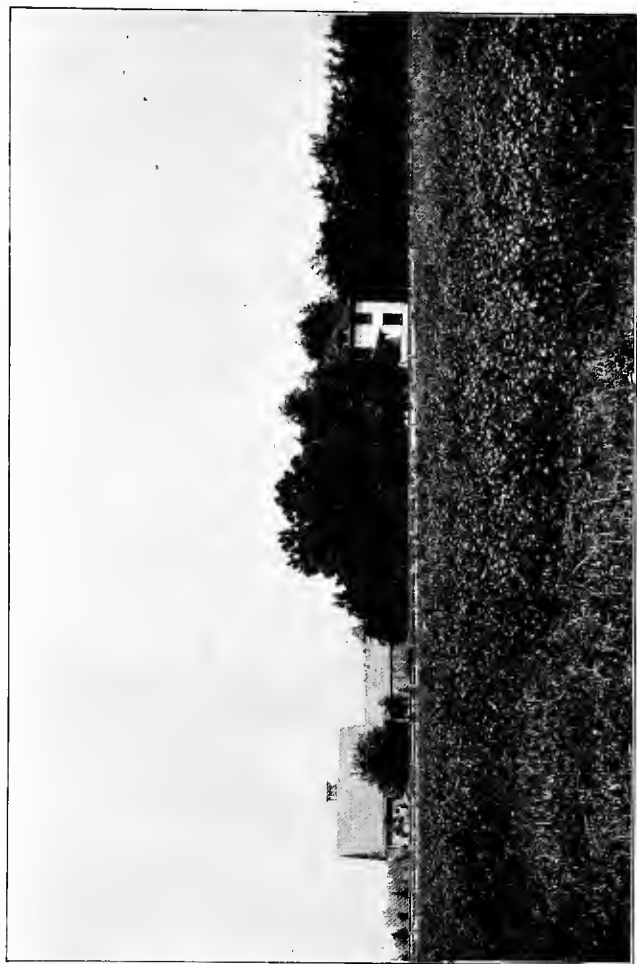


Fig. 83. A clover-field in the Willamette Valley, Oregon.

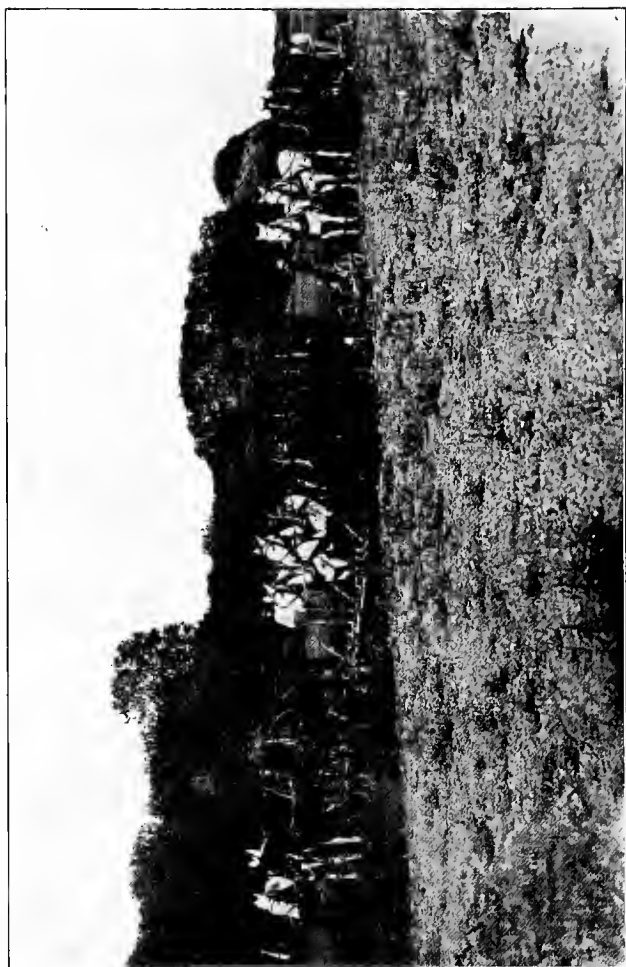


FIG. 84. Breaking up virgin ground in Grande Ronde Valley, eastern Oregon. Six-horse teams an element in the economic development of the region.

part of the area, the temperature is not greatly different from that of Illinois.

Irrigation is practiced most largely in southern Idaho and Oregon and central Washington, but is nowhere so completely depended upon as in the other parts of the western states. Only about 15 per cent of the crops is grown by irrigation. About one acre in one hundred and fifty of the land area was under irrigation in 1900. Since that time there has been a considerable development of the irrigated area, where with fruit especially excellent results are obtained. It is estimated that the water-supply would irrigate 7 per cent of the land in these three states.

Six irrigation projects under the reclamation act are under consideration or under way in these three states which, it is estimated, will bring under irrigation, when fully developed, nearly one million acres of land. A considerable portion of this area is, at present, public land, and will be open to homestead entry.¹

The soils are mostly of a volcanic or of alluvial origin and are usually fertile and enduring. The prairies consist of an expanse of rolling hills. While the surface is frequently, perhaps usually, quite irregular, it is not such as to prevent the use of improved machinery. The climate permits the use of the combined harvester and thresher, and thus small grain can be raised cheaply. A 160-acre farm was the commonest-sized farm in this region in 1900, but the size of farms is said to have greatly increased in recent years. The layout of the farms and the general aspect of the improve-

¹ See Appendix, page 390.



FIG. 85. A Willamette Valley fruit farm, Oregon.

ments are similar to those in the newer portions of the North Central states. The people are generally native-born Americans from the older settled states. There is a general air of prosperity and hopefulness among them.

The population is not large, either in proportion to land area or in proportion to cultivated area. There are, however, two large business centers, Portland and Seattle, the latter being one of the most important ports in America. The transportation facilities to these business centers are generally fairly good. The trade with Alaska, the growing oriental trade and lumber industry all furnish a market for agricultural products. When the proportion of improved land and the fact that small grain alternates with summer fallow are considered, the price of land in this region must be regarded higher than in Minnesota and the Dakotas. Only a few of the farmers are tenants.

There are still thirty million acres of unappropriated and unreserved public lands ready for entry in this region. While some of it is forest land and some is arid, this region probably contains the best large body of public land yet open for settlement in the United States.

CALIFORNIA

Population, numbers	1,485,053
Farms, numbers	72,542
Land area, acres	99,950,080
Area in farms, acres	28,828,951
Improved area in farms, acres	11,958,837
Average size of farms, acres	397.4
Average size of improved area, acres	164.8
Average value per acre	\$24.57

California is rather unique in its crop adaptation and agricultural development. Almost every form of plant life, except the strictly tropical, finds a congenial home within its borders. Nearly all the cultivated fruits of

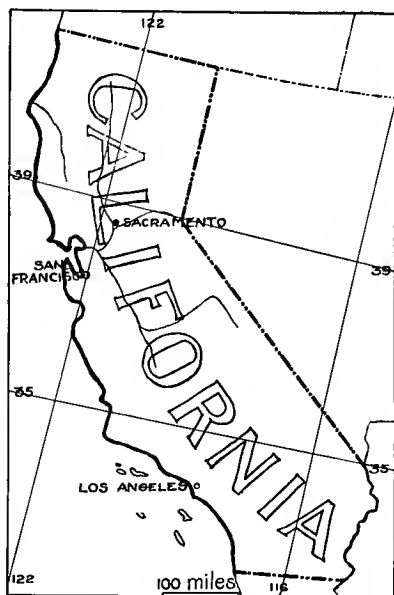


FIG. 86. California.

the world, except those of the tropics, can be found growing in a single county of the state. In its development, the state has gone through three stages: mining, wheat-farming and fruit-raising. Its agricultural productions are now somewhat evenly divided between fruits, cereals and animal products.

One-fifth the area of California is in forests. Those of the most commercial importance are in the coast region between the northern border and Santa Cruz. Here occur the famous redwood forests, in which one million feet of lumber per acre are among the possibilities; while on the Sierra Nevadas, in northern California, occur ten isolated areas of the equally famous Big Tree. Ten million acres, or one-third the forest area, are in national reserves or in parks.

The main agricultural lands lie in the valley of the Sacramento and San Joaquin rivers, bounded on the west by the low Coast Range and on the east by the high Sierra Nevadas. Mt. Shasta stands sentinel where these mountains join on the north, and Mt. Tehachapi where they join on the south. The fields in this area are large and the soil is easily tilled. While by no means always level, the topography, as well as the climate, has aided in the development of the highest types of labor-saving machinery for the production of cereals. Economic production, rather than big yields, has been the factor in developing the extensive culture of cereals. The soils have suffered under cultivation more from excess than lack of soluble salts. The deadly alkali has caused widespread and serious difficulties.

Northern California, including the valleys just mentioned, is rather sharply divided from southern California in climate and crop adaptation and development. Southern California is arid, and is devoted mainly to subtropical fruits, which are usually irrigated. In this area occur the Mohave and other deserts, occupying twenty million acres, or one-fifth the area of the



FIG. 87. A small irrigation ditch bordered with oleanders, at Fresno, California.

state; while some of the most densely populated and highly improved portions of the state are between and in the vicinity of Los Angeles and San Diego.

The rainfall in northern California ranges generally from ten to twenty inches, being higher toward the north and on the higher levels toward the east and west, and less in the center and toward the south. The temperature conditions are in sharp contrast with the regions farther east. The isotherms run north and south instead of east and west. There is said to be a thermal belt running from Oroville (latitude of Philadelphia) in northern California southward about seven hundred miles, varying from one to thirty miles in width east and west, in which oranges and other citrous fruits can be successfully grown. The seasonal variations of a given locality are often less than the climatic conditions between two localities not far distant. The average summer and winter temperatures at San Francisco are nearly the same. The average annual minimum temperature is 50° Fahr.; the average annual maximum, 62° Fahr. The variation from day to day is slight. The difficulties concerning the use of water in California are varied, and require thorough study of local conditions before making investments.

The population is larger in proportion to land area, and smaller in proportion to its improved farm area, than any other part of the Western states. Of its million and one-half of inhabitants, nearly one-half live in or within seventy-five miles of San Francisco. California consists of detached and, except for railroads, isolated communities containing prosperous, keen, alert and

refined people. Beyond is the wilderness. The variations in topography, soil and climate have brought about a segregation and specialization of industries, particularly in horticulture, not paralleled elsewhere in America.

Its rivers, its coast-line of about one thousand miles and its railroads furnish excellent transportation facilities from and to its main agricultural areas. The highways, in general, are good. San Francisco, which has been the principal seaport of the Pacific coast states, has enjoyed an immense export trade in wheat and other products with Europe and the Orient; while refrigerator cars and fruit-shipping associations have made it possible for the state to invade the eastern markets of the United States with its choicest fruits.

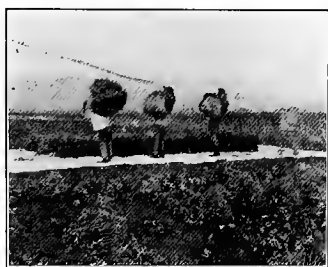
While the value of improvements is not large in proportion to the value of the total area in farms, the improvements are, nevertheless, frequently of the highest order, and sometimes are almost palatial. Considering the area of unimproved farm land, farm values are among the highest in the United States. Averages for the state do not, however, give a true idea of conditions. Eighteen of the twenty-nine million acres of farm land are held in tracts of over one thousand acres. This vast area consists of less than five thousand farms. This land is valued at \$15 per acre. Over thirty thousand persons own farms between one hundred and less than one thousand acres at a value of \$35 per acre. Over thirty-five thousand persons own farms of less than one hundred acres each. The average value of these small farms was, in 1900, \$179 per acre. In other



Cutting sweet peas.



A load of seed ready for the cars.



Carrying lettuce in the drying cloths.



Threshing radish.



Chinese and Japanese workmen cutting onions.

FIG. 88. A GARDEN SEED FARM IN THE SANTA CLARA VALLEY, CALIFORNIA.

words, half the farmers of the state own land worth \$179 per acre. Land of this character constitutes 25 per cent of the value of all farm land, although constituting less than 4 per cent of the area. Good orange land with water may have a value of \$250 to \$300, while the best groves in bearing may bring \$1,000 and upwards. It is a state of farm-owning farmers, comparatively few of the farms being rented.

The Pacific coast in general, and California in particular, is just now in a state of expectancy concerning its future development. The trade with the Orient possesses vast but unknown possibilities, while the Panama Canal bids fair to have a far-reaching effect on the Pacific coast trade. When these trade developments come, if they do come, the climatic conditions are such as will make this state to many extremely attractive.

CHAPTER XVII

THE OUTLYING POSSESSIONS OF THE UNITED STATES

ALASKA

Population, numbers	63,592
Farms, numbers	12
Land area, acres	378,165,760
Area in farms, acres	159
Improved area in farms, acres	159
Average size of farms, acres	13.25
Average size of improved area, acres	13.25
Average value per acre ¹	\$8.05

THE northern half of Alaska is a rolling mossy, marshy plain, with alders, dwarfed spruces and willows dotting it far to the north. It is not believed to have any agricultural possibilities. The southern half of Alaska is extremely broken and mountainous, Mt. McKinley reaching 20,464 feet above sea-level. At 2,000 feet above sea-level the land is eternally covered with snow, and its mountains contain the highest glaciers known outside the polar regions. In the valleys along the streams, even as far north as 65°, the long days of summer thaw the ground to the depth of two or three feet. It is these valleys which present agricultural possibilities. The soils are mainly of igneous or volcanic origin in the higher altitudes, while in the

¹ The average value per acre is based on buildings only. No valuation of lands is reported.

valleys, generally unconsolidated clays and gravels, either primarily or secondarily of glacial origin, prevail. About one-tenth the area is covered with forests, the best of them being next the coast and in the southeastern portion, where Sitka spruce, balsam fir, hemlock, red and yellow cedar abound. In general, the

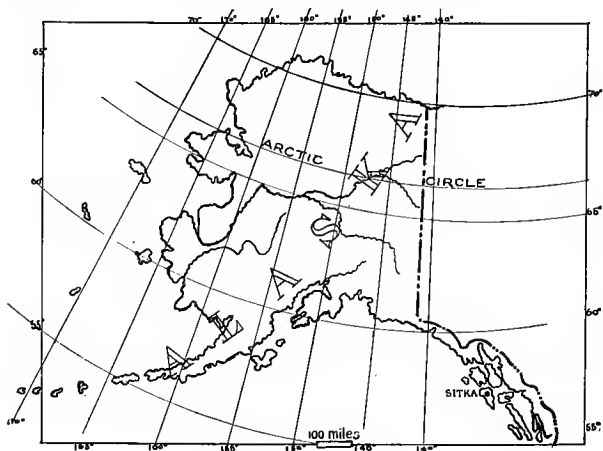


FIG. 89. Alaska.

timber is probably not equal to that further south along the Pacific coast.

Since this region of the midnight sun has a greater area than that of all the states bordering upon the Atlantic seaboard, and since agricultural products are necessary to the development of its mineral and other resources, the Government has sought to determine the agricultural possibilities by establishing a number of experiment stations even as far north as 65°. These

stations have succeeded in producing fair yields of barley, oats and rye, although frosts, which may occur inland every month in the year, sometimes prevent their ripening. Potatoes and other vegetables are raised successfully by the natives, and at mission stations and military posts. The region has an abundance of grasses and other forage. West of a north and south line through Cook Inlet, open prairies abound. Because of the exceedingly moist summers and long, although not exceedingly cold winters, animal husbandry has not yet made much progress. On account of the high price of butter and its ease of transportation, it is thought that dairying could be developed in favored localities. Domestic reindeer were introduced from Siberia in 1891, and already occupy an important place in the development of Alaska. In almost all parts of the country they can subsist all the year round on the native vegetation. They are excellent for packing and for drawing sleds, and furnish meat and hides.

The Japan current modifies the temperature along the extensive coast and in the adjoining islands, preventing extremely cold temperatures in winter and making the rainfall heavy in summer. The temperature of winter rapidly becomes more severe in passing inland. Although steady and long-continued, the weather is not so severe as in the same latitude in Canada, but is more severe than in Europe.

The twelfth census reports, for this vast area, twelve farms aggregating 159 acres. There have been no government surveys of the public lands, and there are, therefore, no land titles. A recently enacted home-

stead law allows 320 acres of land to each bona fide settler. The greatest necessity for the development of Alaska is the construction of transportation facilities. In 1904, the Secretary of the Interior declared that "as yet not a single good wagon-road penetrates Alaska at any point." Transportation is on the backs of natives or pack animals, or by sleds drawn by dogs or reindeer. About one-half the population is white; the rest is composed of Eskimos, Aleuts and Indians.

While Alaska probably never can become a great agricultural country, it is believed that, with adequate transportation facilities, a class of people accustomed to northern climates could profitably develop sufficient of the favored sections to supply the needs of the population engaged in developing its other resources. Gold, copper, coal and oil are found in no inconsiderable quantities, while the deposits of tin are believed to be unusually extensive. The fishing industries are equally, if not more important than the mining industries, even at the present time, salmon, halibut and cod being taken in immense quantities. Seal- and fox-breeding for pelts is carried on under government lease.

At present, the territory is annually drained of its wealth. The mass of the profits of the industries finds investment elsewhere; while those persons who make their homes in Alaska are relatively poor. It is hoped, and by some believed, that a proper development of railroad transportation will encourage the home-seeker and the home-builder, and make it possible to retain at least a part of this annual outpour of wealth within the borders of the territory.

PORTO RICO

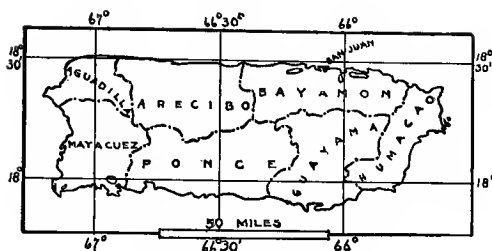


FIG. 90. Porto Rico.

Population, numbers	953,243
Farms, numbers	39,021
Land area, cuerdas ¹	2,307,840
Area in farms, cuerdas	1,757,774
Improved area in farms, cuerdas	477,987
Average size of farms, cuerdas	45
Average size of improved area, cuerdas	12

The chief products of Porto Rico are coffee, sugar and tobacco. More than one-third the cultivated area is in coffee. While of less commercial importance, the banana and the plantain are no less important to the life of the people. They are universally raised in numerous varieties and forms, the former eaten raw and the latter cooked, forming an important part of the sustenance of the people. Minor subsistence crops are tanier,²

¹The cuerda is the Porto Rican unit which, by the United States Porto Rican Census of 1899, is held to be equivalent to the United States statute acre.

²Tanier, also written tannier, is a West Indian plant, *Xanthosoma sagittifolium*, cultivated in the tropics for its farinaceous tuberous root, which resembles that of taro, to which it is akin,

sweet potatoes, cassava¹, upland rice, beans and maize, while there is a large number of fruits produced on the island, some cultivated, but many growing wild. It is believed that the soil and climate favor the production of citrons fruits, coconuts, pineapples, guava² and cassava. Horses and cattle are raised in considerable numbers.

Porto Rico has a population approximating that of West Virginia, and a land area about one-sixth that of the same state, upon which to support her population. This comparison is not altogether inapt, since the topography of no other state has so much in common with this "Rich Gate of the West Indies and the Spanish Main."

The Island may be divided into three parts. (1) The central and greater part of the island is mountainous, varying from 1,000 to 4,000 feet. It is very much broken and eroded, making the cultivation of the soil and transportation difficult and frequently impossible. (2) Surrounding this, and gently sloping to the sea, is an area in places several miles wide, composed of coral limestone. This may be level or in the form of conical hills, depending upon the amount of erosion. (3) Lower

¹ Cassava is an important food staple in tropical America and on the coast of Africa. It is a species of *Manihot*, a euphorbiaceous genus. From its tuberous roots, cassava-bread, cassava-starch and tapioca are made. Three different species are used; the juice of one, the bitter cassava, is poisonous. Other names of the plant are manioc, mandioc, mandioca, maniocca.

² Guava is the fruit of a tropical tree of the same name, belonging to the genus *Psidium*. There are two well-known varieties: white (*P. pyrifera*) and red (*P. pomiferum*) guava. The fruit is shaped like a pomegranate, but is much smaller. It is used for making jelly.

down is the coastal plain. This consists of low, rounded hills, lagoons, swamps and rich alluvial lands. A soil survey has been made from north to south across the island, covering about one-tenth its total area.¹ The soils are mainly derived from igneous and volcanic rocks, and while under proper moisture conditions are



FIG 91. In the mountainous portion of Porto Rico.

generally productive, several hundred years of continuous cropping have reduced their crop-producing power. The climate and soil are such, however, that under proper management its productivity may be readily restored.

The Adjuntas clay, Alonso clay and Tanama stony loam, all consisting of reddish or purplish clay, typical

¹ Soil Survey from Arecibo to Ponce, Porto Rico, by C. W. Dorsey and party. U. S. Dept. of Agr., Field Operations of the Bureau of Soils, 1902, pp. 793-839.

of coffee soils the world around, are the chief types used for growing coffee. The important sugar-cane soils are, in order of preference as surveyed by the Bureau of Soils, the Ponce loam,¹ Arecibo silt loam;² Ponce sandy loam,¹ Portuguese adobe,¹ and Vivi sandy loam.² The order of preference for tobacco is Vivi sandy loam, Arecibo silt loam, Adjuntas clay and Tanama stony loam. The climate of Porto Rico is tropical. Killing frosts have never been known to occur. The normal annual temperature at Arecibo is 76.1° Fahr., and the monthly normal scarcely varies 3° Fahr. therefrom for any month.

The northern two-thirds of the island is moist, the southern third so dry as to make irrigation necessary for the successful cultivation of most crops. Adjuntas, at an elevation of 2,000 feet, has an annual rainfall of about one hundred inches. Tropical hurricanes occasionally do much damage. The island enjoys the reputation of being healthful and delightful. The scenery is likewise said to be magnificent. On the southern portion of the island the water-supply, as at present developed, is not adequate for the area under cultivation, while much of the island, on account of its position, can not be irrigated.

Except for one or two roadways built at great expense, and some short pieces of narrow-gauge railway, the island possesses no means of internal transportation, except trails on which persons and pack-horses only can travel at the most favorable times, while at some

¹ Irrigated.

² Unirrigated.

seasons of the year they are unsafe even for man or beast.

The proportion of white to colored population in Porto Rico is about as three to two, or about the same as in Virginia. The population is largely rural, there being only two towns, Juan and Ponce, of over twenty-



FIG. 92. Unimproved roadway in Porto Rico.

five thousand inhabitants. The population is, as a class, extremely poor. Only a small percentage of the population can read or write any language. Only about one-fifth the population of school age attend school, principally on account of lack of school facilities; but some children are kept from school even in this warm climate through the lack of clothes. There are, therefore, practically no local markets.

The average size of the farms is about fifty acres,

about one-fourth of which is cultivated. The farms are usually owned by the occupants, and nine-tenths of them are owned by whites. The labor is performed largely by "peons," so called, who are usually satisfactory, at forty to fifty cents per day.

The farming methods are of the most primitive type, except upon some of the larger sugar and coffee plantations. The wooden plow and the heavy machete are the principal farm implements. Laws relating to land titles are defective. Corporations, also, are restricted in their purchase of real estate for farm purposes. This has caused a hesitation about the investment of capital, which has been particularly important to the sugar industry, whose proper development requires large capital. At the present time, the agriculture of the island is in a depressed condition, doubtless due to a number of causes, some of which are legislative and capable of correction. It is believed by those best able to judge that the agricultural possibilities are worthy of development and furnish opportunities for men with some capital and proper training.

HAWAII

Population, numbers	154,001
Farms, numbers	2,273
Land area, acres	4,127,360
Area in farms, acres	2,609,613
Improved area in farms, acres	294,545
Average size of farms, acres	1,148.1
Average size of improved area, acres	129.5
Average value per acre	\$22.10

In crop adaptation, Hawaii is more like Louisiana than any other state in the Union. The census reports the yield per acre of sugar-cane at twelve times, and that of rice at five times, that of other parts of the United States. These crops are the chief source of wealth, the islands having comparatively few other resources. More than three-fourths of the arable area is devoted to sugar-cane, the products of which represent

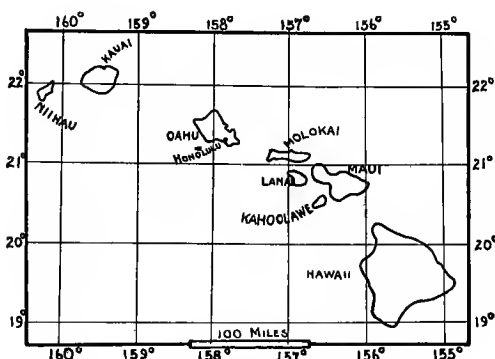


FIG. 93. Hawaii.

over four-fifths the value of all crops. Hawaii holds third rank among the cane-sugar-producing countries of the world, Java and Cuba leading, with Hawaii leading in the average yield per acre. In methods of cane cultivation, Hawaii is said to lead all other sugar-producing centers which, together with the economy of manufacturing, the superior climatic and soil conditions, serves to make the sugar-making areas of Hawaii the most remunerative in the world.

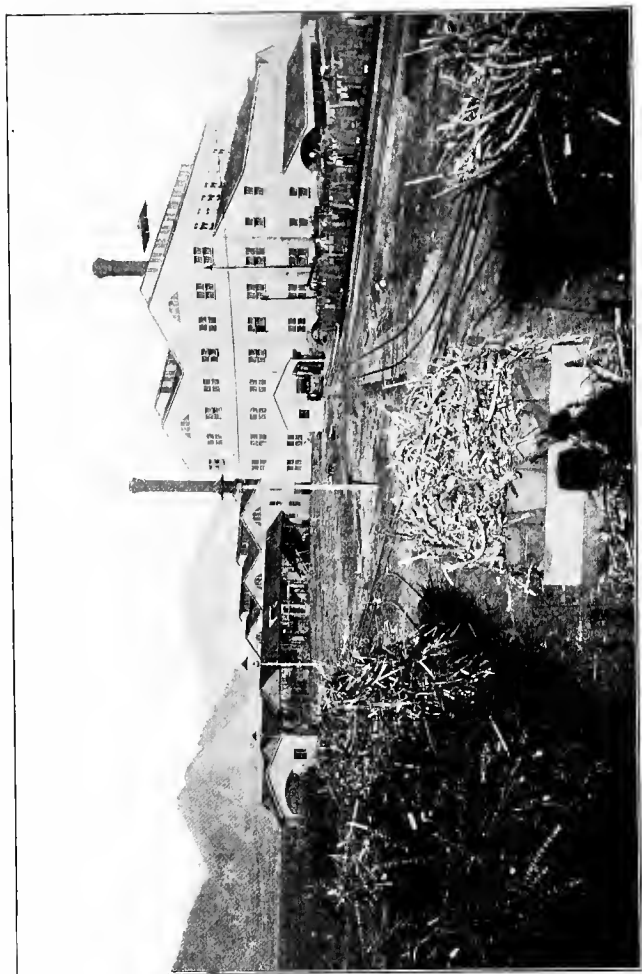


FIG. 94. Sugar plantation looking inland. Seven miles from Honolulu, Oahu Island, Hawaii

Next in importance to sugar-cane and rice, are taro,¹ coffee and bananas. Fruits and vegetables grow readily, but are seriously attacked by fungous diseases and insect enemies not being held in check by their natural enemies. Live stock husbandry, including poultry, is hindered by contagious diseases, while the horn-fly is a serious pest to neat cattle at the lower elevations. For these reasons, the carabao² has been introduced. The islands, however, produce a surplus of horses of the bronco type, which are said to be especially fitted for army use in tropical countries.

The territory has been largely denuded of its forests. Reforestation is one of the problems that is being worked out under the direction of the National Bureau of Forestry. The territory of Hawaii comprises a group of twenty islands lying twenty-one hundred miles to the southwest of San Francisco. Only eight of the islands are habitable, the other twelve being mere rocks and coral reefs. The most important are Hawaii, Maui and Oahu.

The islands are of volcanic origin, and are of comparatively recent formation. The major portion of the large islands is untillable, because of mountains and volcanoes which reach elevations ranging from 8,275 to 13,805 feet. Basaltic lavas in various stages of decomposition form the basis of the soil, while in the low-

¹ Taro (*Colocasia antiquorum*, var. *esculenta*) is an aroid plant which produces large, fleshy root-stocks. When cooked, these have an agreeable flavor. The root enters largely into the dietary of tropical countries.

² The carabao is also known as the water-buffalo, from its habit of seeking the water in order to escape insects. Sometimes called Chinese water-buffalo.

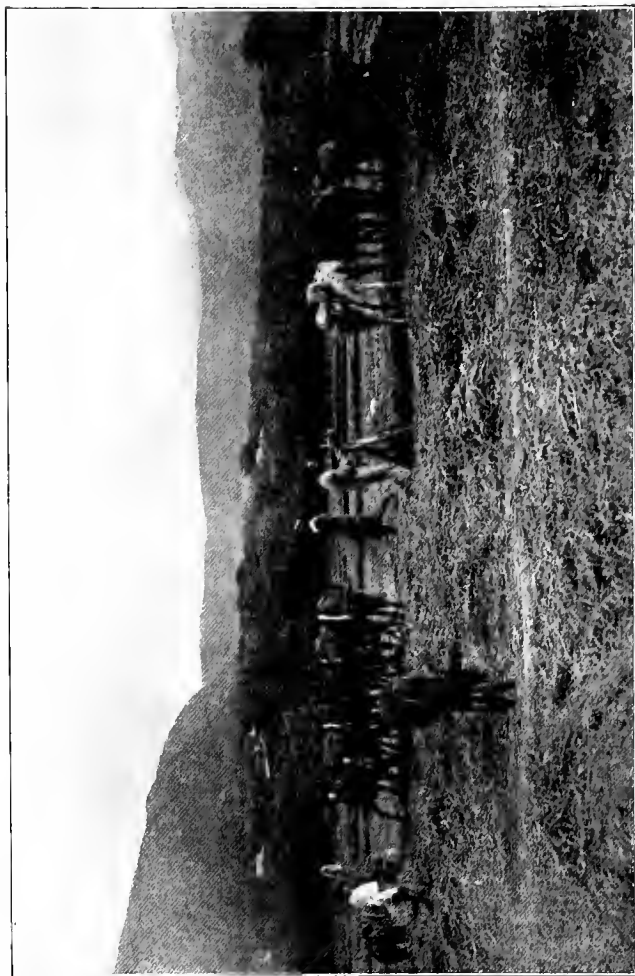


FIG. 95. Chinese threshing rice near Honolulu.

lands sedimentary soils have been deposited to great depths. The soils are exceedingly fertile and easily tilled. The uninhabitable islands contain large guano deposits, thus furnishing fertilizers at a low price.

The trade-winds and ocean currents make the climate superior to other points of the same latitude (22° N.). The average annual temperature varies from 74° Fahr. on the seacoast, and 64° on the highlands to 32° on the highest mountains. The climate is generally healthful and, by many, greatly admired. The average annual rainfall ranges from forty-two inches on the island of Oahu to one hundred and twenty inches on Hawaii. Owing to the physiographic features of the islands, the rainfall is very unevenly distributed, varying from a few inches to two hundred inches, most of the precipitation being on the higher slopes and windward side of the mountains, and decreasing toward the sea-level. Instances have been noted where the rainfall on one part of a plantation was ample, while on the same plantation at a lower altitude it was quite insufficient for the production of any crops. The practice of irrigation especially on the leeward sides in recent years has transformed the islands, about 45 per cent of the cultivated area being now irrigated. The average value per acre of unirrigated farms is nearly twelve dollars, while that of irrigated farms is nearly fifty.

Over 60 per cent of the islands is owned in farms. Only about 2 per cent of this area is in cultivated crops, while about 40 per cent is in pasture. The utilization of pasture-land for growing sugar-cane and the reclamation of marshes for the cultivation of rice and

bananas are serving to increase the cultivated area. Large sums of money are invested in sugar plantations which are owned by corporations whose stocks are regularly listed and bought and sold upon the stock markets. Ninety-seven per cent of the farm area is owned by 116 corporations, the average ownership thus being nearly twenty-two thousand acres each. Fifteen hundred farms are owned in tracts of less than twenty acres. The average size of a sugar plantation is over six thousand acres; of rice plantations, less than forty acres. The rice industry has been largely developed by the Chinese on land which was formerly considered valueless.

The value of land varies greatly with the islands. The average value of farm land in Hawaii is less than nine dollars per acre; in Oahu, over one hundred dollars per acre, while in Niihau the single farm of sixty thousand acres is valued at seventy-five cents per acre. The farming population is somewhat equally divided between whites, Hawaiian, Chinese and Japanese. The white and Hawaiian farmers usually own the land or work it through a manager, while the Chinese and Japanese are almost exclusively cash tenants. The present land system encourages ownership, there being five systems in vogue whereby one may obtain possession of the land.

There is but a small percentage of illiteracy among the natives. Practically all Hawaiians and Portuguese under fifty years of age are able to read and write their own language; while nearly all Hawaiians of the younger generation can read and write English. Labor



FIG. 96. Coffee plantation in the District of Kona, Island of Hawaii.



FIG. 97. Banana plantation in Hawaii.

for the conduct of the sugar plantations has become a serious problem. Before annexation, laborers were obtained by contract from other countries. The present immigration laws prevent contract labor, as well as the immigration of the Chinese. The buildings constitute less than five per cent of the value of farm lands.



FIG. 98. Coconuts near Honolulu, Hawaiian Islands.

The principal markets are in the North' Central states, shipments going via San Francisco and Cape Horn. Facilities for passenger traffic are meager. Insular railway facilities are likewise in their incipency. Honolulu enjoys tramway and electric railway facilities, electric lighting and excellent telephone service, while the telegraphic system among the principal islands is fairly well developed.



FIG. 99. Manila hemp, or abacá, plantation, Albay, Island of Luzon, P. I.

There are in the neighborhood of 1,720,000 acres of public lands, of which nearly one-third is barren. About one-eighth is first-class agricultural land. Twenty-five thousand acres are classed as kula, rice, taro and sugar lands. Nearly all the islands contain public land more or less valuable for the production of sisal, coffee, pineapples and vanilla beans.

THE PHILIPPINES

Population, numbers	6,987,686
Farms, numbers	815,453
Land area, acres	73,615,375
Area in farms, acres	6,987,257
Improved area in farms, acres	3,214,138
Average size of farms, acres	8.6
Average size of improved area, acres	3.9

The economic plants of the Philippine Islands are mostly of tropical or subtropical origin. But few crops grown require cultivation,—merely planting and harvesting and not always the former being necessary. The most important vegetable products are Manila hemp (abacá),¹ rice, sugar, copra and tobacco. Manila hemp furnishes two-thirds the value of all exports. Sugar ranks second. Because of the enormous home consumption of cigars and cigarettes, and the demands of the export trade, tobacco forms the basis of a large industry. Northern Luzon is the principal center of production of tobacco.

Rice, the principal food of the natives, is not, at

¹ Abacá is the native Philippine name of the plant *Musa textilis*, which yields Manila hemp; also spelled *abaka*.

the present time, raised in sufficient quantity for local consumption on account of the destruction of their carabaos. Maize, in some districts, replaces rice as a staple food, while the camote, a kind of sweet potato,

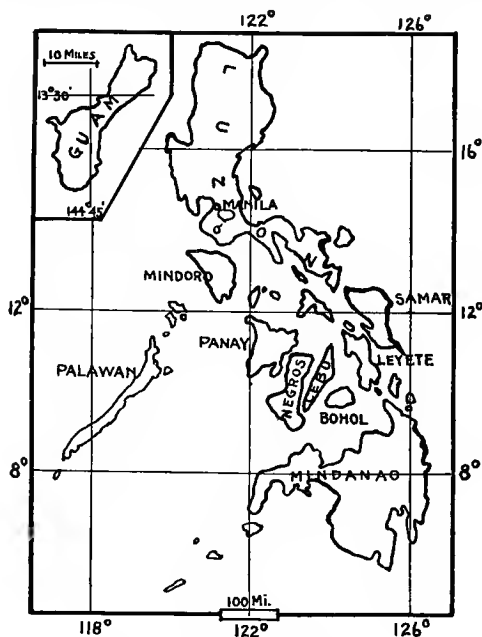


FIG. 100. The Philippines.

and bananas are, aside from rice, the most extensively grown and most important food plants in the islands. Mangoes, oranges, pomelos and other tropical fruits grow readily. There are enumerated upward of three hundred fiber plants, while plants yielding gums, resins,

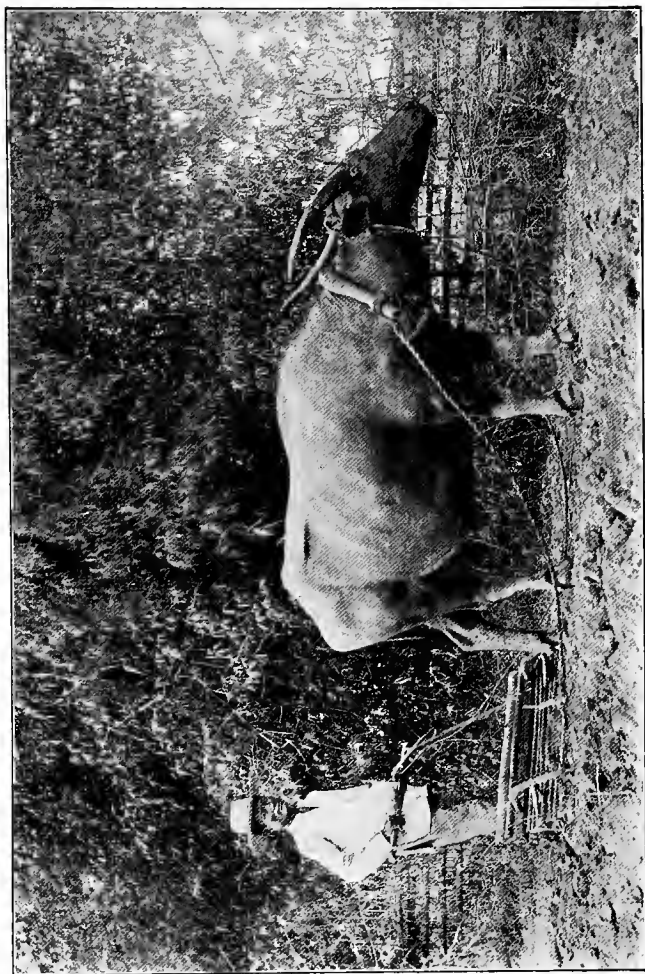


FIG. 101. Harrowing for rice with the water-buffalo and scuffer, in the Philippines.

dyes, waxes, oils and medicines abound. Pepper, cinnamon, nutmegs, vanilla and other spices occur. The coconut, which furnishes the copra of commerce, is the principal nut, while the betelnut¹ finds wide use among the natives after the manner of chewing tobacco.

The carabao, or water-buffalo, is the most important domestic animal, while its hide and horns are of commercial importance. The ordinary domestic animals of the United States are not so well adapted to the climate. Horses of a pony type, however, were produced in large numbers prior to the prevalence of surra, from which thousands have died. Both the Indian and the European type of neat cattle occur on the islands, the latter being the more prevalent. The common fowl is more important in the cock-pit than in the flesh-pot, cock-fighting being the national sport. In some localities, duck-raising is extensively carried on.

Approximately, 70 per cent of the total land area, or 80,000 square miles, is in forest, mostly hard wood of high value. The stand per acre is estimated at over two thousand cubic feet, netting a quantity of timber in the islands more than double that in Washington and Oregon together. The forests are under the control of the Bureau of Forestry, which has established fourteen districts comprising fifty-five stations. No timber is cut except under license, payment being made according to quantity and value of timber taken.

Ascending from the level to an altitude of about

¹ The betelnut is the fruit of an East Indian palm, *Areca catechu*. It is supposed to promote digestion. The powder of the nut is used as a vermifuge. The nut is the shape and size of a hen's egg.

four thousand feet, broad-leaved trees are found; beyond that height, pine trees prevail. The forests comprise trees of a great variety of economic uses. The mineral resources are gold, iron, copper, zinc, lead, marble, coal, petroleum and natural gas. While each has been more or less exploited, little is known of their extent.

The archipelago is quite mountainous and has many volcanic areas widely distributed. The mountain peaks, generally the remains of extinct volcanoes, are frequently from four thousand to seven thousand or more feet above the sea. It is estimated that only one-third of the area is adapted to agriculture, and most of this can probably be cultivated only with great difficulty. Manila Bay, however, is included in a valley one hundred and fifty miles long, averaging about fifty miles in width, which is quite level. The soil of this valley is mostly alluvial. This valley is probably the most important agricultural area in the Philippines, and contains one and three-fourths millions of people. Next to the island of Luzon, the most important agricultural district is in occidental Negros, the principal seat of the sugar industry. Land values there are higher than elsewhere in the Philippines. The island of Cebu is an important source of hemp prized on account of its light color.

The Philippines, lying entirely within the tropics, have, of course, a tropical climate. The average annual temperature at Manila is 80° Fahr., at Washington, D. C., 54° Fahr. The highest recorded temperature at Manila is 100° Fahr., at Washington, D. C., 104° Fahr. The lowest recorded temperature at Manila is 60° Fahr.,

at Washington, — 17° Fahr. Most of the archipelago is south of Manila, although most of the island of Luzon is north.

One year's observations at different stations show variation in rainfall of from sixteen to one hundred fifty-two inches, the average annual rainfall being seventy-six inches at Manila, during a period of thirty-four years. There are wide variations in the distribution of rainfall. Generally, on the west of the islands there is a rainy and a dry season; on the east, the rainfall is more evenly distributed, as well as being greater. At Manila the rainy season is from May until November. During July, August and September the average rainfall is over forty inches.

The mortality on the islands is large, due to the prevalence of epidemic. The usual tropical disorders occur here, but, nevertheless, while it is admitted that the climate is enervating, it is claimed that it is not, with proper precautions, unhealthful. Hurricanes, some occasionally causing death and devastation of property, pass over the archipelago almost annually. No recent disastrous eruptions have been reported of any volcanoes, although the volcano of Mayon, or Albay, has been in intermittent eruption since 1616.

According to the Philippine Census of 1903, there were 3,141 islands in the archipelago, of which 1,473 were without names. The total area is estimated at 115,026 square miles, or about equal to the area of Arizona. Seven-eighths of all these islands have an area of less than a square mile; twenty-nine have an area between 100 and 10,000 square miles; while the

only islands which exceed this area are Mindanao, 36,292 and Luzón, 40,969 square miles, the latter being a little less than the area of New York State. The islands of Mindoro, Paragua and Mindanao, constituting about 40 per cent of the whole area, are but little cultivated.

In the United States there are more than five acres



FIG. 102. Plowing for sugar-cane in the Island of Negros, P. I.

of improved farm land per inhabitant; in the Philippines there is about one-half acre of cultivated farm land per inhabitant, not counting the non-christian tribes. The average size of the farm in the United States in 1900 was 147 acres; in the Philippines, 9.0 acres. More than 80 per cent of the farmers own the land which they cultivate. Comparatively little shelter is required for man or beast, except from sun and rain. The improvements, therefore, are usually limited. The

implements and methods of agriculture are of the most primitive kind. With proper wages and efficient management, laborers among the natives are available and satisfactory. The prevailing custom is to pay them with a share of the products of their labor.

Shipping facilities between the Philippines and foreign countries have been sufficient, and are increasing. Insular maritime traffic is constantly increasing, upwards of two hundred ports being open. The United States, Great Britain, France and China are the principal importing countries, the first two countries taking the largest quantity of hemp exported, while the French trade is mainly in copra. Transportation by wheeled vehicles is generally difficult throughout the islands. Construction of roadways is generally expensive and, owing to the heavy rainfall, the system of maintenance is quite inadequate. The mileage of steam and electric railways is at present relatively insignificant. A few tramways conveyed by carabao have been built in the principal agricultural districts. Much of the exports reach the local markets on the backs of natives.

The non-agricultural population, whether in cities, villages or elsewhere, is not such as to make much of a market for high-class food products. The total civilized population is about seven million. Most all are of the brown races, there being but 42,000 of the yellow, 14,000 of the white, and 1,000 of the black races. About 2,000,000 can read, 1,000,000 can read and write, while 77,000 belong to what are called there the educated classes.

The United States has somewhat recently come into

possession of other islands in the Pacific Ocean, the most important of which are Guam (200 square miles), the largest island of the Ladrone or Marianne archipelago, and Tutuila (54 square miles), one of the Samoan or Navigator group. In crop production and agricultural conditions, they are similar to the Philippine Islands.

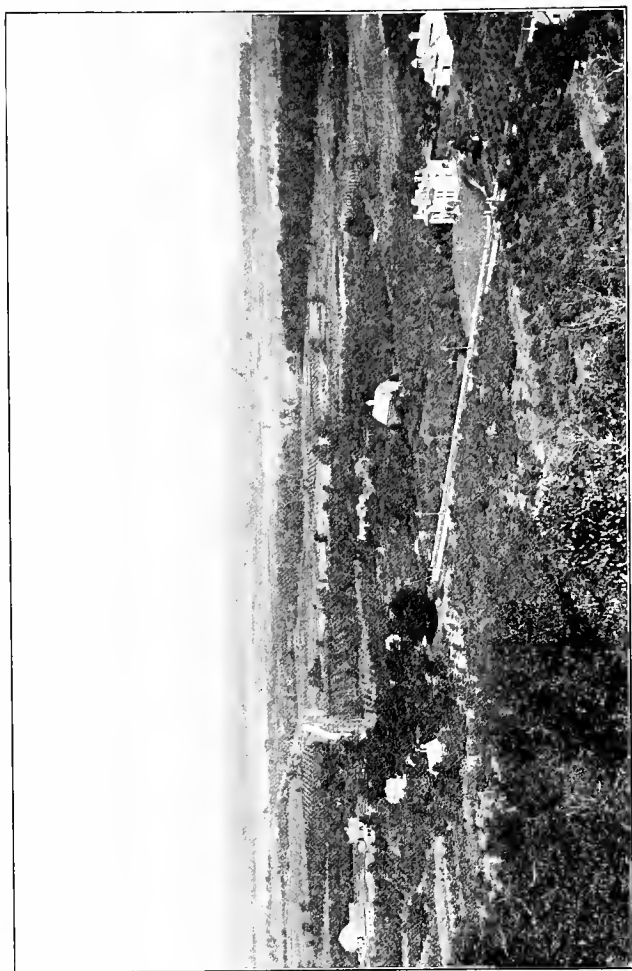


FIG. 103 View of the farming region from the mountains near Grimsby, Ontario.

CHAPTER XVIII

NEIGHBORING LANDS OF THE UNITED STATES

THE DOMINION OF CANADA

The Provinces

ONTARIO, QUEBEC, NOVA SCOTIA, NEW BRUNSWICK, MANITOBA,
BRITISH COLUMBIA, PRINCE EDWARD ISLAND,
ALBERTA, SASKATCHEWAN

Population, numbers	5,318,606
Farms, numbers	544,688
Land area, acres	1,014,240,640
Area in farms, acres	63,422,338
Improved area in farms, acres	30,166,033
Average size of farms, acres	116.4
Average size of improved area, acres	55.4
Average value per acre	\$22.12

THE physiography, soils and crop adaptation of the southern and agricultural portion of Canada are similar to the corresponding areas immediately south of the Canadian border. Passing from east to west are regions corresponding to the Appalachian, Lake, Prairie, Plains and Mountain, and Pacific Coast regions of Northern United States. "In a general view, Canada consists of the mountain region of the West; the prairie country between the Rocky Mountains and Hudson Bay, and Woodland region comprising the four provinces of Ontario, Quebec, New Brunswick and Nova Scotia.

The width of these several belts, east and west, is mountain, 600 miles; prairie, 1,000; woodland, 2,300." Generally speaking, the altitude is less than in corresponding regions across the border. The elevation of the land decreases as one proceeds northward, a fact which influences, to some extent, crop production. The crops correspond in kind on both sides of the border, although the relative quantities

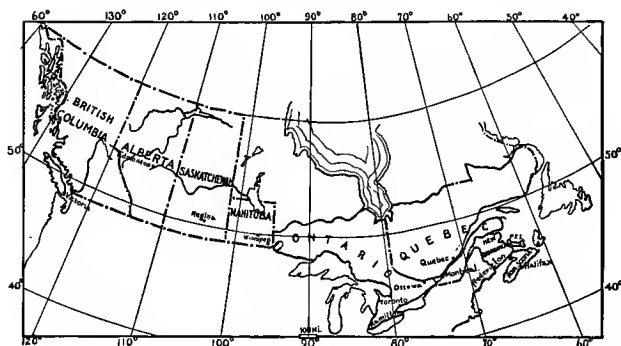


FIG. 104. The Dominion of Canada.

are somewhat changed on account of climatic and other conditions.

Canada may be divided into the nine provinces corresponding in some measure to states of the United States, and into five territories. The provinces of Canada are characterized by the relatively larger amounts of wheat and oats, as well as their large yields and high quality. Ontario raises chiefly winter wheat, while Manitoba and Saskatchewan raise spring wheat. Average annual yields of twenty to

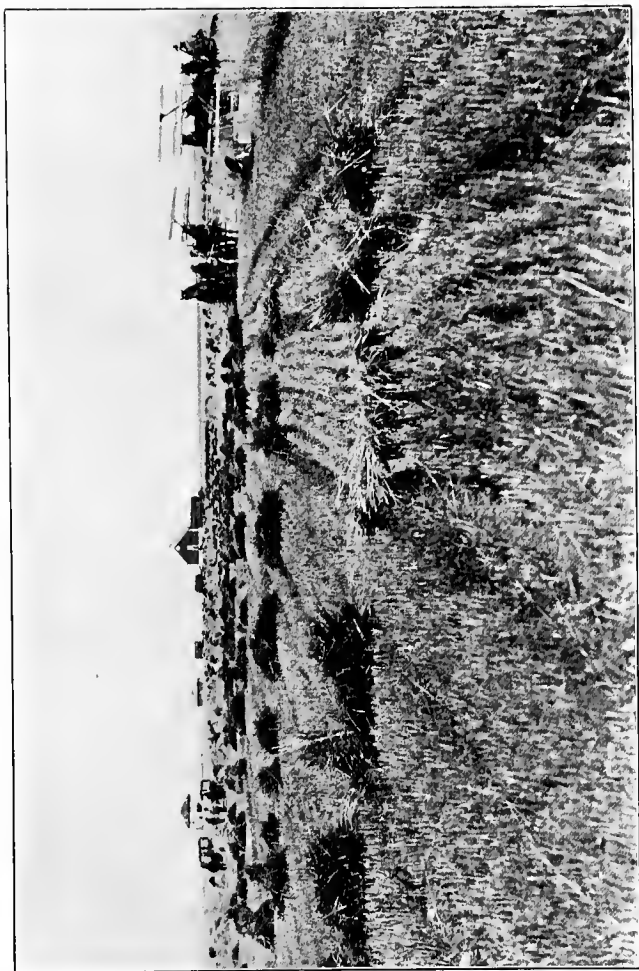


FIG. 105. Cutting wheat at Indian Head, Saskatchewan, Canada.



FIG. 106. Part of a flock of 2,200 yearling ewes at Gull Lake, Saskatchewan, Canada.

twenty-five bushels of wheat, and thirty-five to forty-five bushels of oats are not uncommon. The provinces raise relatively more barley and rye, and less maize than even the northern portions of the United States. Cheese-making is relatively much more common than butter-making, Canada being the greatest cheese-exporting country in the world. Meat production is more common in the eastern portions, especially in Ontario, than in the corresponding states. In Ontario are to be found some of the best specimens of pedigreed stock on the American continent. In Ontario, on the borders of the lake, are to be found fine fruit districts.

While over a region of such wide extent and variety of physiography the soils vary, on the whole, they are fairly fertile, although the need of animal husbandry in Ontario and the provinces farther east in maintaining the crop-producing capacity of the soil is fully felt. The farms are of moderate size, being similar to those of the North Atlantic states. Except in Manitoba, Alberta and Saskatchewan, which are mostly prairie or plains, the farms have been hewn out of the forests. Of the improved area, about one-third is in pasture and two-thirds in field crops, while of the unimproved area, two-thirds is in woodland. In addition to the farm woodland, Canada has vast forests. The great spruce forests of eastern Canada are one of her greatest resources, while the Douglas fir is only relatively less valuable on the Pacific coast. In Manitoba, about one-third the total farm area is in field crops, while the rest is largely unbroken prairie.

While the growing season is short and the winter long, the temperatures are not notably more extreme than in corresponding regions in northern United States. On both coasts, the total precipitation is rather heavier than in the corresponding areas to the south, while in the interior it is rather less. The whole region is characterized by its heavy snowfall. The farm water is usually pure and abundant. While the climate is rigorous, it is generally healthful and invigorating.

The proportion of population to improved land is about the same as in those North Central states east of the Mississippi River. In these states, however, the land area is almost all in farms, except in northern Michigan and Wisconsin, while in the provinces of Canada less than one-tenth of the area is occupied in farms. This is due, in part, to the unoccupied forest area in northern Quebec and Ontario. The population is largely rural, corresponding in this particular with southern and western United States. Market conditions generally are probably not so favorable to the farmer as in the United States for corresponding character of farming and location of farm. Farm labor is, perhaps, more easily obtained and of a more satisfactory character. The farming population, as well as the population as a whole, is nearly exclusively British, mostly descendants of immigrants from the mother country.

The Atlantic ports of Canada are ice-bound in the winter. In the summer the inland port of Montreal is three hundred miles nearer London than Boston. The Lakes and the St. Lawrence and inland canals furnish water-ways of a high order. Railway transportation,

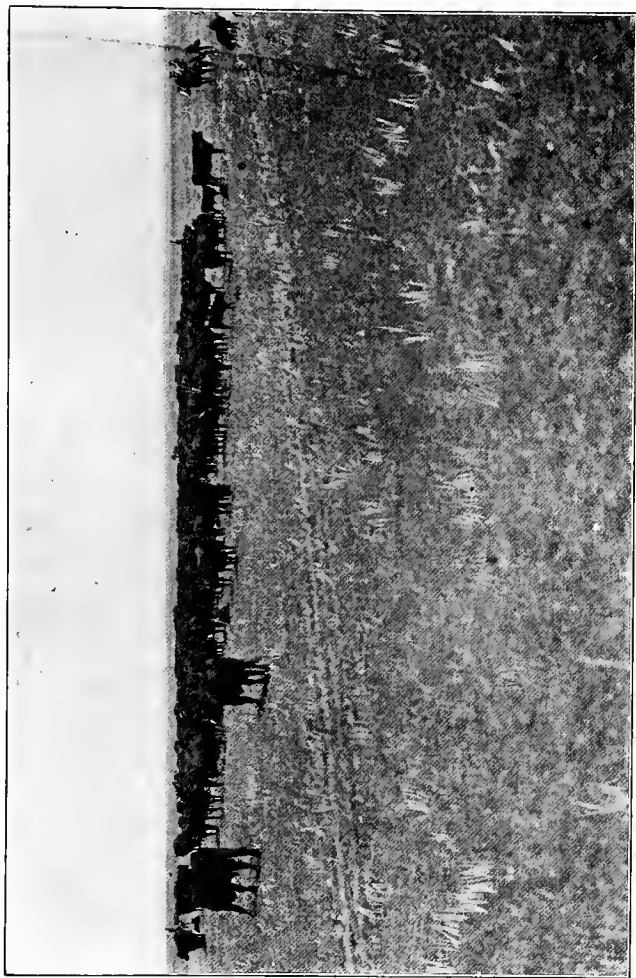


FIG. 107. Herd of 700 Galloway cattle at Stair, Alberta, Canada.



FIG. 108. Apple orchard at Coldstream Ranch, Vernon, British Columbia.

while of good character, is not so abundant as in the older-settled regions of the United States. The public highways are fairly good, although the snow of winter frequently impedes travel.

The farm lands in Ontario and the eastern provinces are rather irregularly laid out, the fields are frequently small and not the most adaptable to the use of improved farm machinery. On the prairies of Manitoba and Saskatchewan, however, the economic production of the smaller cereals is possible in a high degree. In general, throughout the provinces the farm improvements are substantial. The dwellings, while usually not elaborate, are comfortable and homelike. The lands vary in value with the provinces. The average value per acre in Ontario is \$35; in Quebec, \$24; in Manitoba, \$12, and in Saskatchewan and Alberta, \$7.

While there are considerable areas of public lands in northern Ontario and Manitoba, vast areas of "crown" and railroad lands are still open to settlement in Saskatchewan and Alberta. These two new provinces, recently created from the four districts of Alberta, Assiniboia, Saskatchewan and Athabasca, are each equal in size to Texas. Together, they are larger than the combined area of the Dakotas, Montana, Wyoming and Colorado, and more than half the area of the seven older provinces of Canada. The southern half of Saskatchewan, containing the valley of the Saskatchewan River, is being rapidly settled. The increased production of spring wheat of high quality and large yield per acre in this region has been one of the recent surprises in the agricultural development of the world.

This is a region of cold winters, but the summer days are long and the amount of sunshine large. The total precipitation varies from fifteen to twenty-five inches. A relatively large amount of the precipitation falls in the growing months, however, making the raising of summer cereals possible and reasonably certain. The surface is level or gently rolling, the land easily brought into cultivation and subsequently easily tilled. The raising of cattle is being rapidly developed in Alberta, where the conditions are not unlike those of Montana. Southern Alberta and southwestern Saskatchewan are arid or semi-arid. At Calgary, one of the largest irrigation projects on the continent is nearing completion. While Alberta and Saskatchewan extend from the international boundary to the sixtieth parallel north latitude, the region at present available for settlement, lies south of the fifty-fourth parallel. For a discussion of land laws and the conditions of acquiring title to Canadian public lands, see Appendix, p. 383.

Aside from its agriculture, Canada's resources are lumber, minerals, including gold, iron, tin, coal and fish. Its fishing industries are the largest in the world. These, together with increasing manufactures and increasing population, seem destined to furnish the farmers of the provinces with an abiding prosperity.

The Territories

KEEWATIN, YUKON, MACKENZIE, UNGAVA, FRANKLIN

Population, numbers	52,709
Land area, acres	1,302,442,880

The five territories, containing an area greater than the nine provinces, have, on account of their climatic conditions, but little agricultural possibilities, although the area of land considered fit for cultivation is being constantly widened. The resources of this region consist of minerals, lumber, fur and fish.

NEWFOUNDLAND

Newfoundland, about the size of the state of New York, is mountainous and forested. While it has some good agricultural land, and while its island character tempers the climate somewhat, the chief industry is fishing. It is an importer of foodstuffs.

MEXICO

Population	13,570,545
Area, acres	504,885,200

Mexico has more topography than agriculture. Mining is its chief industry. It stands second among the silver-producing countries of the world. Altitude has a marked influence upon its agricultural products. Within its area are to be found plants of every climatic zone. The variety of economic plants is very large; their production, very limited. Agriculturally, Mexico is usually divided into the coastal plain, adapted to sugar-cane and rubber; the coffee region between the coastal plain and the plateaus; and the central tablelands, on which temperate and south-temperate products grow. Maize is grown throughout all three regions and

is the staple food of man and beast. The principal agricultural exports are coffee and henequin, or sisal hemp, the latter being raised in Yucatan, a large proportion of which is said to be too sterile to yield any other crop. A not inconsiderable amount of tobacco is raised, especially in the vicinity of Vera Cruz. While cotton and rice are grown in several districts of Mexico,

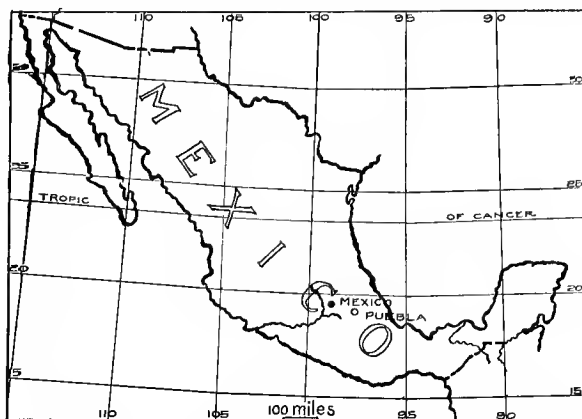


FIG. 109. Mexico.

the output is insufficient for local consumption. A great variety of fruits is grown in Mexico, but none in great abundance. Many wild plants yield economic products, the most important, in a commercial sense, being chicle. A million dollars' worth of the product of this wild tree is annually shipped to the United States to be used in the manufacture of chewing-gum.

Mexico being practically devoid of fossil fuel, the timber of the higher and more settled sections has been

largely exhausted. Forests of great value, including mahogany and other cabinet woods, exist on the lowlands, but, on account of their location, they are generally unavailable for domestic purposes. The table-lands of northern Mexico correspond in character and adaptation to the grazing lands of western Texas and New Mexico. While there are vast areas said to be adapted to the rearing of cattle and sheep, the number reared is small compared to that of Texas and New Mexico, and they are of inferior quality. Mexico imports considerable quantities of pork. Horses have only recently entered into the economic life of the people, the chief dependence being the donkey or burro.

The soils of the coastal plain on either coast are generally fertile and the rainfall is sufficient for the growth of crops. On the plateaus, which constitute by far the larger portion of Mexico, the soils are not so fertile, and the rainfall is generally deficient. Grazing and cultivated areas suffer alike from the want of pure water for domestic and other purposes. While irrigation is practiced to some extent, the methods are primitive and the amount of water insufficient.

There are two seasons,—the dry season, from November to May, and the rainy season, from June to October. There is no true winter. For any particular location, the monthly and daily temperatures do not vary greatly, although the diurnal variation may be considerable. The coastal plain region is thoroughly tropical; above five thousand feet the climate is considered cold, although the mean is 60° Fahr. and the minimum temperature rarely goes below 20° Fahr. Between

three and five thousand feet it is considered temperate, ranging the year through from 65° to 75° Fahr. This has been referred to as the region of eternal spring. It is the region of the largest population, as well as agricultural development, although not of greatest productivity. Insect pests and malarial fever prevail on the coast. While the climate of the upland is generally healthful, the lack of water and fuel and a not too fertile soil prevent a rapid expansion of the cultivated area.

In area and population, Mexico is not widely different from the South Central states, the area being somewhat larger and the population slightly smaller. The population consists of whites, mixed breeds and Indians, of which 19 per cent is white and 43 per cent of pure Indian blood. The per cent of illiteracy, even among the whites, is large. In some sections the only commodity the Indians buy is salt. Local markets for farm products would be small were it not for the great mining industry. Silver, gold, copper, coffee, sisal and chewing-gum are the chief sources of wealth. The price of agricultural products is, therefore, rather high.

Mexico has naturally rather poor harbors, practically no navigable streams, and the transportation of agricultural products to the sea-board from the table-lands has been so difficult as to be practically prohibitive. Railroad transportation has been greatly developed within recent years, the mileage being at present about equal to that of Texas or of Illinois, although the area of Mexico is about three times that of Texas and fourteen times that of Illinois. Fair transportation facilities

now connect the interior of Mexico with the United States.

Only a small proportion of the total area is cultivated. The land holdings may be divided into two kinds: those of the large plantations, or haciendas, some of enormous extent, and the farms of the small cultivator. Some of the large plantations are well improved, but not infrequently they are greatly neglected. With the exception of a few of the larger plantations, the agricultural methods are primitive. The agricultural productions can not be considered large, either in proportion to area or population.

Large tracts of public or vacant lands remain, which can be purchased from the Mexican government at from fifty cents to two dollars and a half per acre. Much of it has not yet been surveyed. The government has a custom of leasing lands in large tracts for agricultural and other purposes.

Much has been written concerning large enterprises for the exploitation of tropical products, such as rubber. These enterprises have not yet passed the experimental stage. Investment should not be made in them without personal investigation. Two hindrances to the agricultural development of Mexico—lack of transportation facilities and lack of security to person and property—have been measurably rectified. Direct transportation facilities with the larger cities of the United States point to the possibility of profitable production of bananas, citrous fruits, and other tropical and semi-tropical products.

The demand for young cattle in the United States

and the increased demand for wool and mutton should, help to develop the grazing areas of northern Texas and, perhaps, other favorably situated areas. The time will come when the increasing population of the United States will necessitate the agricultural regeneration of Mexico.

THE STATES OF CENTRAL AMERICA

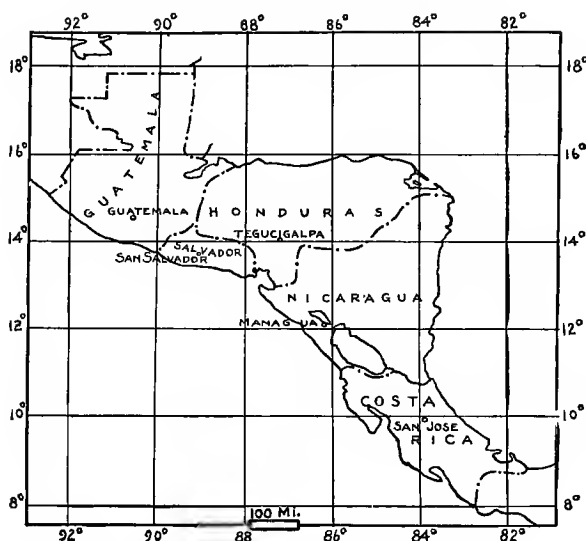


FIG. 110. The States of Central America.

	Population	Area, acres
Guatemala	1,842,134 (1903)	30,905,600
Salvador	1,006,848 (1904)	4,624,000
Honduras	744,901 (1901)	29,600,000
Nicaragua	380,000 (1895)	31,488,000
Costa Rica	243,205 (1892)	11,776,000

The Central American states have the same range of economic plants as has Mexico. The high table-lands occupy even a larger proportion of the area than the latter. Volcanic disturbances frequently cause great loss of life and property. Since the trade-winds are from the east and the highlands extend nearly to the Pacific coast, the rainfall is extremely large over the eastern and central portions of the area, and forest growth heavy and valuable. The population is chiefly collected on the uplands near the western shore, while the greater portion of the area is in virgin forest. The areas facing the Pacific coast are fairly well developed with plantations of sugar, coffee, rice, cotton and live stock. Maize and black beans form the staple food of the inhabitants. Because Salvador is located principally on the western shore, it contains the densest population, while dense forests have thus far prevented the development of Nicaragua.

The lack of means of internal transportation is one of the greatest hindrances to the development of this area. In all tropical countries the cost of clearing the land and keeping it free from tropical growth is also a barrier to agricultural development. In recent years, a considerable trade has grown up between the eastern coast and the United States in bananas, coconuts and other tropical products. The western shore, however, has the chief harbors, which are among the best anywhere on the Pacific coast. They are now largely cut off from the world's markets, but with the completion of the Panama Canal, a new exploitation of these countries will probably follow.



FIG. 111. Cutting sugar-cane in Cuba.

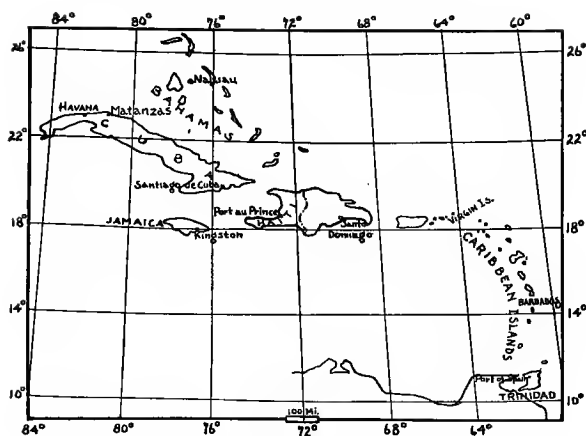
THE WEST INDIAN ISLANDS¹

FIG. 112. The West Indian Islands.

	Population	Area, acres
Cuba ²	1,572,797	28,160,000
Bahamas	54,000	3,388,000
Jamaica	695,731	2,692,480
Barbados	186,789	106,470
Haiti	610,000	18,079,360
Virgin Islands	57,166	238,080
South American Islands	341,853	1,691,520
Caribbee Islands	670,230	1,506,560

Raw sugar, molasses and rum have been the most important productions of the West Indies. While the

¹ Porto Rico was treated in Chapter XVII on The Outlying Possessions of the United States and is not included in the present discussion.

² This table has been prepared from various authorities, such as the Census of Cuba, 1899; Hill's Cuba and Porto Rico with other islands of the West Indies; and Morris' Report of the Economic Resources of the West Indies, Kew Bulletin, Additional Series I.

industry has been recently in a depressed, if not in a decaying, condition, these products are still, probably, commercially the most important. In Haiti, Trinidad and the Lesser Antilles cocoa takes an important place; in Jamaica and Haiti bananas and other citrous fruits are largely raised; while in Cuba, next to sugar, tobacco is the most important crop. The Bahamas are not adapted to the production of sugar. Pineapples have been their chief crop, although competition by Cuba, Jamaica and Florida has caused some decline. The larger Indian islands produce coconuts in commercial quantities, while Jamaica is noted for its production of ginger and pimento. Coffee is raised at moderate elevations in many islands, but nowhere extensively, compared with Brazil, Mexico or Porto Rico. Sweet potatoes, maize and bananas are the chief subsistence crops.

Of domestic animals, neat cattle, horses and mules are most important. In both quantity and quality neat cattle generally occupy an inferior place, the climate and native pastures in the interior valleys, however, are said to be well adapted to their production. The fauna and flora vary greatly in different islands. In common with other tropical countries, the number of economic plants is large, although the number of commercial importance is small.

The islands vary greatly in size and topography, as well as in government. Perhaps no equal area has been divided among so many different nations. Generally speaking, the larger islands are extremely mountainous and their interiors difficult of access, although on some



FIG. 113. Pineapples in Cuba.

islands, notably Jamaica, excellent roadways have been constructed. The altitude of the mountains, compared with the surrounding plain, is very great. They are said to be the most precipitous in the world. While there are exceptions, the smaller islands are usually less elevated and more level. The larger islands have the larger proportion of forest and of waste land, and generally the smaller population in proportion to the area. For example, Cuba has one acre in one thousand in cultivation, while every foot of Barbados is under cultivation, except 6 per cent occupied by towns, roadways and cliffs. The population of Cuba is thirty-seven per square mile; in Barbados, 1,120, the densest population of any country outside of China. Most of the agriculture is on land within one thousand feet of the sea, while the larger towns are near the coast. Wherever highlands exist, they are sparsely settled.

The soils below two thousand feet elevation are usually calcareous; above two thousand feet, non-calcareous. With the possible exception of the Bahamas, the climate is entirely tropical. Tropical disorders are common, and the white race becomes acclimated only at great sacrifice. Hill affirms that the white man can not do manual labor there and live. Cuba is the only island in which the white race has become numerically dominant.

The rainfall on the coast and throughout the smaller islands is heavy, being in the neighborhood of sixty inches. The annual variation is often large. Where the islands are mountainous, the rainfall is heavier in the northern and lighter in the southern portion. The



FIG. 114. A Cuban water-cart.



FIG. 115. A Cuban dairy.

rainy season is from May to October, although the rainfall is usually not inconsiderable in other months of the year.

The temperature seldom goes above 100° Fahr. and, except at the higher elevations, seldom below 50° Fahr.; although the mean annual temperature, as well as the humidity, is high. The West Indian Islands are in the hurricane tract. The volcanoes of the Lesser Antilles are occasionally destructive.

Compared with the United States, as a whole, the population of the islands is large. In former days the white population enjoyed the reputation of rather luxurious living. The population as a whole, however, is extremely poor. A large part of the area is cultivated by those who do not own the land. Not infrequently the landowners are non-resident. As an illustration, Barbados has 74,000 acres in sugar-cane, of which 48,550 acres are owned by 150 non-residents. In general, the sugar plantations are not as highly developed as in Hawaii, Louisiana or British Guiana, muscovada sugar being produced almost exclusively. The loss in manufacture is large. Aside from the sugar and other large plantations, the agricultural methods are of the most primitive character. In the Bahamas, it is said that plows, harrows and similar instruments do not occur.

A large part of the land area is privately owned, and, especially in the smaller islands, comparatively little public lands remain. While there is opportunity for a higher state of cultivation, and, with favorable trade relations, for the development of fruits and vegetables,

unlike the continental tropics, there is little virgin soil. Surveys are inadequate and title to land is frequently uncertain.

Cuba

This, the largest island of the West Indies, has an area about equal to New York State and had, in 1899, about one-half the farm area of Rhode Island, while the cultivated area was about one-seventh the improved area of the same state. About ten times as many people, however, earn a living off the farms of Cuba as in Rhode Island. The average size of the farms was 143 acres; of the cultivated area, 13 acres. Four-fifths of the farms have a total area of less than 16 acres. More than half the cultivated area is operated by tenants. About 85 per cent of the cultivated area is operated by whites, whether owners or renters. As determined by the Census of 1899, the following are the principal crops raised in order of acreage: sugar-cane, sweet potatoes, tobacco, bananas, maize, malangas (taro), yucca, coffee, coconut, cocoa, rice, yams, potatoes, pineapples, oranges and onions, of which sugar-cane occupies nearly one-half.

THE BERMUDAS

This group of islands belonging to Great Britain is situated 580 miles east of North Carolina. The principal products are onions, potatoes and lily bulbs. The islands contain an area of about 12,000 acres, one-third of which is under cultivation.



FIG. 116. A view of the mountainous country of Peru. Indians in native costumes.



FIG. 117. The llama, which is especially adapted to transporting loads of 100 pounds or less in the mountainous Andean countries,

CHAPTER XIX

SOUTH AMERICAN LANDS

THE TROPICAL ANDEAN COUNTRIES

	Population	Area, acres
Panama	340,000	20,204,800
Colombia	3,916,666	302,849,280
Ecuador	1,400,000	74,240,000
Peru	4,609,999	445,269,120
Bolivia	2,181,415	450,176,000

THE ancient Peruvians or Incas were all farmers, and in pre-Columbian times there existed in western South America one of the world's early centers of civilization and agricultural development. Since the conquest by the Spaniards, however, the mineral resources of these Andean countries have always overshadowed the agriculture. No crops can be mentioned as typical of this region, although Irish or white potatoes, indigenous to Peru, and maize are perhaps the most common soil products. Wheat, although raised somewhat extensively, does not supply the home consumption. Barley and oats are raised less extensively. Alfalfa thrives abundantly under irrigation. Other important soil products are sugar-cane, coffee, cacao, tobacco, rice and cotton. A perennial tree-cotton in Peru furnishes a staple much prized because goods in close imitation of wool can be manufactured

therefrom. Many fiber, medicinal and aromatic plants are grown or the products gathered from wild plants. These countries are the source of cocaine and quinine, although the supply of the latter has been largely exhausted. Rubber is obtained to some extent and exists in the forests east of the Andes in almost

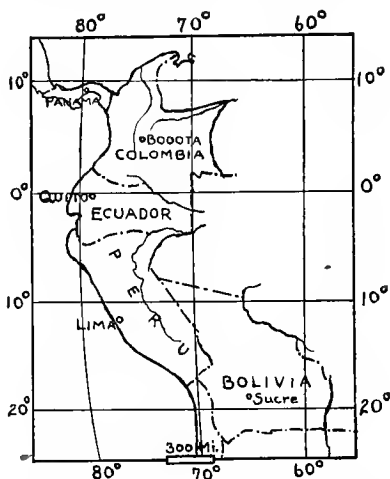


FIG. 118. The Tropical Andean Countries.

inexhaustible quantities. Bananas are raised in Colombia, and the industry is increasing.

Neat cattle, sheep and goats are reared, and hides and wool furnish a not inconsiderable export. That unique wool-bearing animal, the alpaca, is native of this region. These animals are said to be reared only by the aborigines, from whom large quantities of wool are purchased for export. A cross has recently been

effected between the alpaca and the vicuna, the wild prototype of the alpaca, called the "paco-vicuna," which is said to produce the superfine wool of the vicuna and to possess the domesticity of the alpaca.

This region is the most elevated on the American continent, the higher peaks reaching 22,000 feet above sea-level, with the permanent snow-line 15,000 to 17,000 feet, and agriculture developed up to 12,000 feet. There is a relatively small amount of arable land in the coast region and the valleys on the western slope of the Andes, to which the agriculture is thus far chiefly confined. The plains east of the Andes, when cleared, are arable. While the eastern plains of Colombia are treeless, a large part of the rest of the transandean region is covered with trees. While there are occasional plantations and settlements there, for the most part it is a virgin forest ranging from open woodland to the densest tropical jungle.

Between an altitude of 3,000 to 4,000 feet, bananas, sugar-cane, cocoa and other tropical plants flourish. Between 4,000 and 7,000 feet are grown maize, tobacco, cotton and coffee. From 6,000 to 12,000 feet occur in varying degrees, crops of temperate climates, such as wheat, barley and northern vegetables and fruits.

Naturally, every possible climatic condition may be met with in this region. The coast of Peru is an arid desert, while in the foot-hills agriculture is carried on by irrigation. In Panama, Colombia, Ecuador, Bolivia and eastern Peru, the rainfall is generally abundant. There is a considerable annual variation in the rainfall. Between 4,000 and 9,000 feet elevation, where the large

population is found, the climate is temperate. Fires are seldom used except for cooking.

The land is owned by comparatively few people, and much of it thus owned is undeveloped. Vast tracts are often under a single ownership. There is a large civilized as well as a considerable uncivilized population of Indians, and also many half-caste Indians. The region contains the largest Indian population of any equal area upon the American continent. The lands are largely in the hands of descendants of Europeans, while the labor upon the farms is largely performed by Indians, although the Chinese are used to some extent. While some of the large plantations and ranches have introduced modern machinery, modern methods and improved live stock, usually the agricultural conditions are primitive. Transportation facilities are meager. Many of the roadways are mere trails, and materials are chiefly transported by pack animals, including the llama, which is especially adapted to transporting loads of one hundred pounds or less in the mountainous regions, chiefly because of their habit of grazing as they travel. Although railways are being somewhat extended, the contour of the area will continue to make transportation of products difficult.

While this region was the seat of an ancient civilization, and while it was one of the first regions exploited upon the American continent, on account of its gold, silver and precious stones, the proximity of the Andean Mountains to the coast, the general absence of good harbors, and its remoteness from the world's markets have contributed to prevent a rapid extension

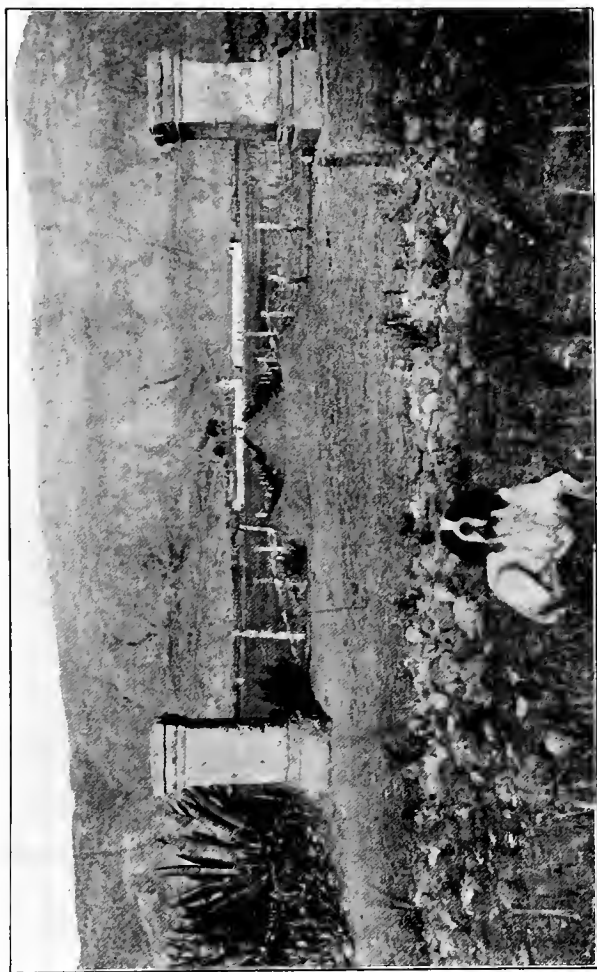


FIG. 119. A characteristic entrance to a Peruvian country estate.

of the cultivated area. The completion of the Panama Canal on the north, and the railway nearly completed from Buenos Aires to the Pacific coast on the south, will doubtless bring about a considerable development; but the region will probably never rank as one of the important agricultural areas of the continent.

VENEZUELA AND THE GUIANAS

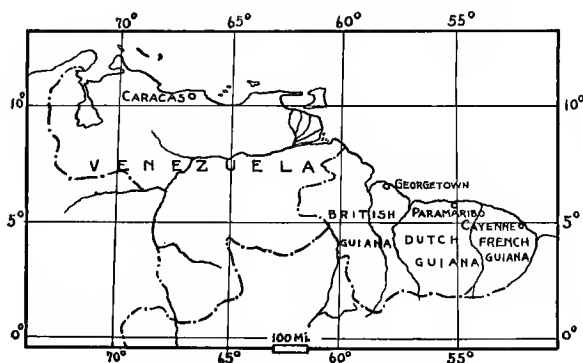


FIG. 120. Venezuela and the Guianas.

	Population	Area, acres
Venezuela	2,323,527	380,123,520
British Guiana	278,328	57,920,000
Dutch Guiana	72,295	29,478,400
French Guiana	32,910	19,520,000

On the inland valleys and plains, the agricultural products, particularly of Venezuela, are cattle, coffee and cacao. The cultivation of the cacao tree is largely confined to northern South America and the West Indies. The number of neat cattle, sheep and goats

reared is about the same as in Texas and New Mexico combined, which have a somewhat larger population on about one-half the area. Along the coast, sugar-cane and, to a small extent, rice are raised. The sugar plantations of British Guiana have been noted for their high production per acre and the perfection of their methods of manufacture. These plantations are situated along the alluvial flats next the ocean and mouths of the rivers, and are protected from overflow by means of dikes and dams, and drained by canals and pumps. They extend back from the seashore three and one-half miles, and, as originally laid out, were one-fourth mile wide. Through purchase, many of these have been consolidated.

Besides the cultivated areas, there are forests, including rubber trees, of large extent and prospective value, although as yet but little utilized, and the wide plains, or *savannahs*, suited to grazing. Gold is widely distributed and is believed to occur in large quantities. Little is known of much of the area, because the configuration of the country and the density of the undergrowth make travel exceedingly difficult. The whole area is an immense plateau, rising abruptly from seashore fringed with the mud flats containing the sugar plantations. This plateau is broken by many streams which are often difficult to cross and, in many cases, are not navigable. The Orinoco and some of its tributaries are navigable, however, which has made possible the development of the interior valleys and plains reached by these streams. Little is known of the fertility of the soil of the inland area.

The climate of the coast region is tropical, with abundant and sometimes excessive rainfall. Since the elevation varies from seashore to mountains continually covered with snow, all climatic conditions may be met. At less than 5,000 feet, tropical and semi-tropical plants occur, while some hardy plants, like potatoes and barley, are cultivated 8,000 feet above sea-level. On the uplands of the interior, as yet but little developed, the climate is said to be delightful and healthful; but on the coast it cannot be said to be so. While the conditions are not so bad as frequently described, in British Guiana and probably elsewhere, the death-rate exceeds the birth-rate.

The population, confined chiefly to the seashore and the river valleys, is composed of the Latin race, civilized Indians, Negroes and many people of mixed race, as well as some Chinese and East Indian coolies. The latter are brought in considerable numbers, under contract, to work on the sugar plantations. There are many Indian tribes which, although retaining their former customs, are usually inoffensive. These tribes cultivate cassava, yams, sweet potatoes and cayenne pepper, the first of which is their "staff of life."

The management and the mode of life on the sugar plantations are similar to that throughout the West Indies. While these plantations have probably suffered less than those of the West Indies from the general decline in profits from cane-sugar, the decline has had a marked influence on the prosperity of the region. To some extent, the development of the gold-fields has offset the depression in the sugar industry.

BRAZIL

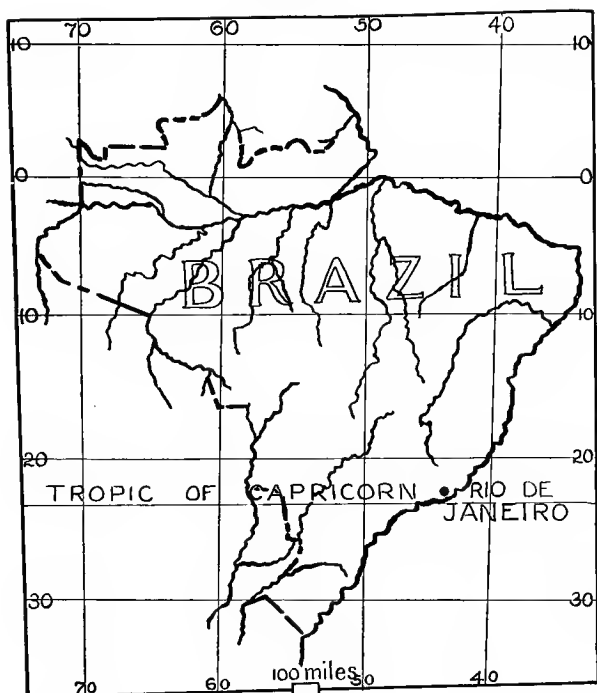


FIG. 121. Brazil.

Population	14,333,915 ¹
Area, acres	2,059,603,200

The two products for which Brazil stands preëminent are coffee and rubber. Brazil supplies about two-thirds of all the coffee produced in the world. The great coffee

¹ More recent statistics, not yet official, indicate a population of about twenty millions.

states are São Paulo, Minas Geraes, Rio de Janeiro and Espírito Santo in the upland region of southeastern Brazil. Next to coffee, the principal cultivated crops are sugar-cane, tobacco and cotton. The consumption of coffee, sugar and tobacco is high. Subsistence crops, such as maize, rice, wheat and mandioca, are less extensively produced. Brazil imports large quantities of wheat flour, butter and other foodstuffs.

The forests are of vast extent, and frequently of great size and density. The forests of the Amazon basin alone occupy an area equal to two-thirds the area of the United States. There is a great variety of trees adapted to numerous economic uses, including gums, resins, fibers, spices and medicinal plants. The export of dye-



FIG. 122. Picking coffee in São Paulo, Brazil.

woods is large. Rubber, however, overshadows all other forest products in present commercial importance. The rubber tree is indigenous nearly all over Brazil, while



FIG. 123. A young coffee plantation in São Paulo, Brazil.

immense forests of rubber, some as yet practically unexplored, exist in the Amazon basin. The statement, sometimes made, that there is immediate danger of exhaustion of the supply of raw rubber has no foundation. Compared to population, a larger number of neat cattle is reared in Brazil than in the United States, from which hides are exported. These are reared mostly upon the prairies, or *campos*, of southern and western Brazil. According to North American or European standards, they are small, mature steers weighing from 300 to 500 pounds.

"The greater part of the country consists of an immense plateau from 1,000 to 4,000 feet above sea-level, bounded on the north and south by the vast depressions formed by the basins of the great rivers, the Amazon and Paraguay." This plateau region corresponds somewhat to the Appalachian Mountain and Piedmont Plateau regions of the United States. It is in this region that the coffee is raised, and general agriculture is followed. It is the area of greatest population and development. Along the coast are to be found the sugar plantations. The land is generally hilly and not infrequently difficult to cultivate. In Brazil the most fertile soils are forested and must be cleared, often at considerable expense, before agriculture can be practiced; while the prairies are rather infertile, and are considered suited only to grazing. Rapid development of Brazil, similar to that witnessed in the North Central states of the United States, cannot, therefore, take place.

Lying under the equator and extending from $4^{\circ} 20' 45''$ N. latitude to $33^{\circ} 46' 10''$ S. latitude, Brazil has been divided by Morize into three climatic zones: (1) the temperate zone, including the states of Rio Grande do Sul, Santa Catharina, Paraná, and most of São Paulo, which lies south of the 20th parallel; (2) the tropical zone lying north of the 10th parallel and including by far the largest area; (3) the warm zone, which occupies the central area of Brazil, between the tropical and temperate zones.

The greatest agricultural development has occurred in the temperate zone. Except for limited areas along

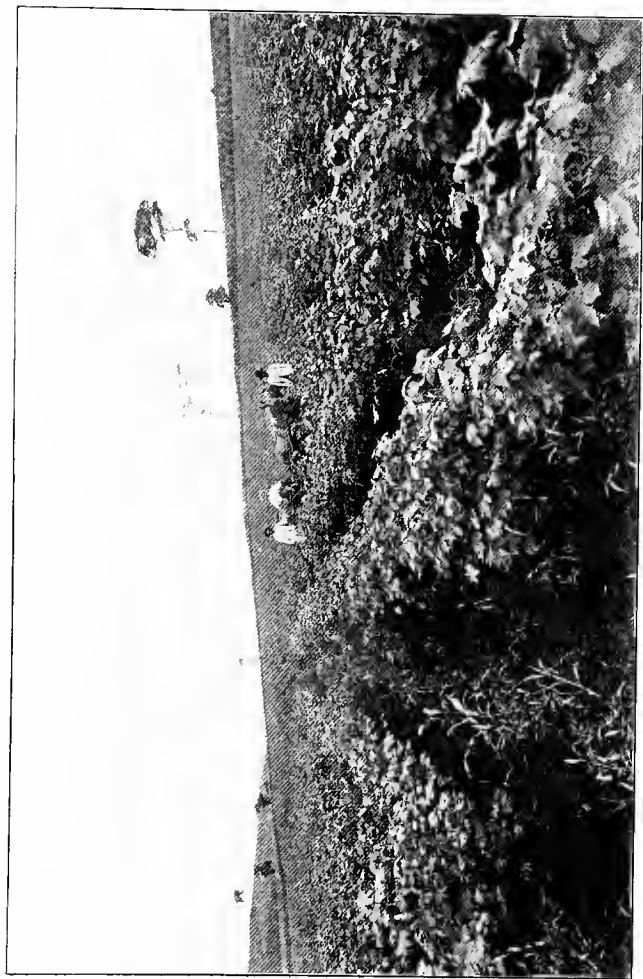


FIG. 124. A Brazilian cotton field with coffee plantation in the background.

the coast and the large rivers, the rest of Brazil is largely undeveloped, and parts of it are, indeed, practically unexplored. Even in the temperate zone snow and ice seldom occur, and frost has practically no influence upon organic life. The rainfall of such a vast area is naturally subject to great variations.



FIG. 125. Casa de administrador, or house of the manager of a Brazilian plantation.

Generally speaking, the rainfall is usually large, but subject to much annual variation, so that droughts are more feared than excess of rainfall. The year is divided into dry season and wet season, which are extremely variable; although in the interior the rainy season is usually from January to May, and the dry season from June to December. While in many places the climate is agreeable and healthful, tropical diseases, including

yellow fever, are prevalent. Over the greater area of Brazil, climatic conditions and the great natural forces have kept mankind thus far in subjection.

Brazil, with an area greater than that of the United States exclusive of Alaska, has about one-fourth the population. In proportion to the land actually devel-

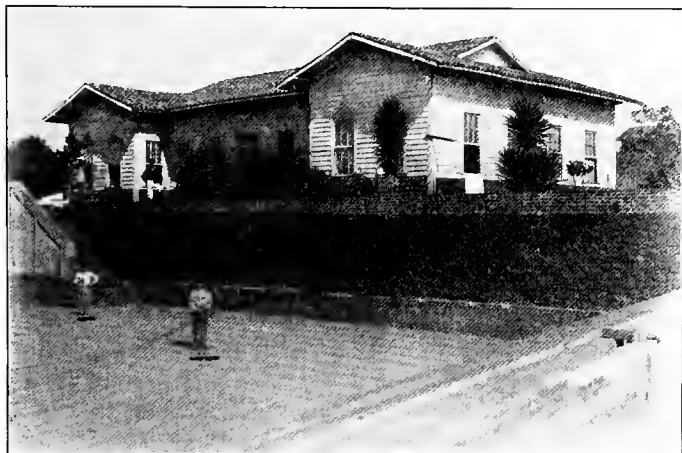


FIG. 126. The country home of a coffee planter in São Paulo, Brazil.
Drying coffee in the foreground.

oped for agricultural purposes, however, the population is not small. Brazil is an importer of foodstuffs, all of which could be raised within her own confines. Its principal market, Rio de Janeiro, is one of the chief cities and principal ports of South America.

The contour of the principal agricultural regions is such as to make local transportation difficult. The railway transportation has been somewhat limited, the

present mileage of Brazil being slightly greater than that of Illinois. Railways are being somewhat rapidly and systematically extended with a view to developing the resources of the country. This will doubtless lead to the extension of those foods whose production has heretofore been limited on account of suitable means of transportation, and will bring about a greater diversification of crops. In extent of navigable rivers, Brazil is perhaps unparalleled.

Farm life, as known in North America, can scarcely be said to exist in Brazil. The coffee plantations of São Paulo will illustrate. This state contains an area about twice, and a population about one-half, that of Illinois. The principal agricultural product, coffee, is raised on about 15,000 plantations, many of them of great extent, while Illinois has over 200,000 farms, mostly of small size. Some of the largest of these plantations contain as high as 100,000 acres and 4,000,000 trees, while plantations of from 100,000 to 500,000 trees are not uncommon. Such plantations employ a large force of men, who are supplied with houses, thus making settlements by themselves. In Brazil the farmstead is divided into three parts, each somewhat separated from the other: (1) the "casa de morada" or the house of the owner in connection with which may be found the drying grounds, storehouse and machinery for cleaning coffee (Fig. 15); (2) the "casa de administrador," or house of the manager (Fig. 125); and (3) the "colonia" or collection of houses for the employees or "colonos" (Fig. 127). Unlike the farmers of the United States, the land-



Fig. 127. The "Colonia," a collection of houses for the employees or "colonos" of a coffee plantation, São Paulo, Brazil.

owners and their families, who may live elsewhere, constitute a small portion of the workers on Brazilian plantations.

Implements for the cultivation of the soil and the seeding and harvesting of crops are usually rather primitive. Plantations upon which coffee and sugarcane are grown often have large sums invested in machinery for the preparing of coffee for market and for the manufacture of sugar. A coffee plantation of first-class quality and location of 100,000 trees is valued at \$50,000. About 400 trees are grown to the acre, but frequently there is considerable land in connection with a plantation not in coffee. A coffee plantation of 110,000 acres, containing 44,000,000 trees, is reported to have been sold recently for \$6,000,000.

The Latin race predominates in Brazil, the larger portion being descendants of Portuguese. In the extreme north, Indians, and in the coast regions in the northeast, Negroes, add an element to the population. The Brazilians, as is customary with Latin races, have been more successful in assimilating these races than have the people of the United States. Seeber estimates the present population of Brazil at 17,000,000, of which 1,300,000 are Indians, 2,400,000 Negroes and 5,000,000 mixed-breeds. Eighty-four per cent of the population can neither read nor write. In the undeveloped portions of Brazil, Indians in the lowest state of savagery still exist. Germans have established successful colonies in the extreme southern portion of Brazil. The greatest immigration, however, is from Italy, the larger proportion of which goes to São Paulo.

The land laws are in charge of the different states, which usually offer favorable opportunity in acquiring land, so far as payments are concerned. The general government gives immigrants shelter and free transportation to any part of the country in which they may desire to live.

Brazil is one of the great world areas. It has such great natural resources that the very grandeur of them has been an impediment to its development. Improvements in engineering have made it possible to do that which was formerly impossible. It yet remains to be seen what sanitary science may do in enabling the white race to labor and to endure the tropical climate. Although Brazil's great need is doubtless laborers, yet, taken as a whole, it is a country for the capitalist rather than for the immigrant or settler.

TEMPERATE SOUTH AMERICAN COUNTRIES

	Population	Area, acres
Argentina	5,160,986	726,937,600
Chile	2,712,145	196,876,800
Paraguay	630,103	100,480,000
Uruguay	978,072	46,214,400

The main soil products of temperate South America are wheat, maize, alfalfa and linseed (flax). These four crops occupy over 90 per cent of the cultivated area in Argentina. Wheat occupies about one-half the cultivated area, with high yield and excellent quality. The yield of maize on the best lands compares favorably with the best maize sections of the United States, although the lack of cold, dry weather at curing-time

adds to the difficulty of harvesting and marketing the crop. Alfalfa occupies one-sixth the cultivated area of

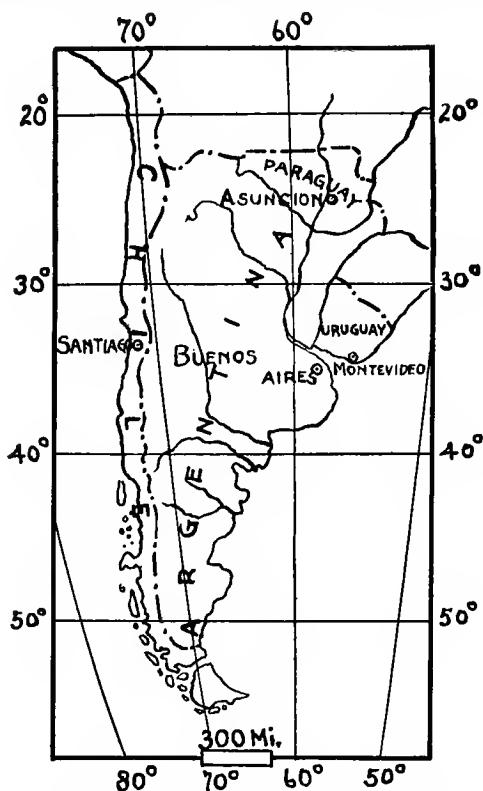


FIG. 128. Temperate South American Countries.

Argentina. It has caused the development without irrigation of vast areas of semi-arid land in the northern and western portions of Argentina. It is estimated that

about eight acres of natural pasture are required to support one steer, but that one acre of alfalfa will support the same animal. Besides being pastured, it is used extensively for hay, and is exported in no inconsiderable quantities. More than one-fourth of all the flaxseed raised in the world is raised in this region. Grapes, although a minor crop, are grown somewhat extensively on the eastern slope of the Andes, north of 40° south latitude. While the evidence seems to be that other fruits common to temperate climates can be successfully raised as well as cotton, sugar cane and tobacco, thus far their cultivation is limited; although considerable quantities of oranges are raised in Paraguay.

It is estimated that about one-fourth of all the sheep and one-seventh of all the cattle of the world are raised in this region. This is due largely to the fact that on account of the mild climate, domestic animals can be born, reared and fattened entirely in the open. Since the grasses grow throughout the year, hay or grain is rarely fed, except in case of drought. The feeding of maize to fattening animals, however, is now advocated. Although some of the finest specimens of beef-cattle in the world are to be found in this region, they do not average as large as in the United States. The most common type of sheep is the long wool, while in Australia and the United States it is the fine wool. Dairying is being rapidly extended. The most modern methods of handling milk and butter are in vogue.

While at present a much larger portion of the land area is devoted to the rearing of live stock than to the

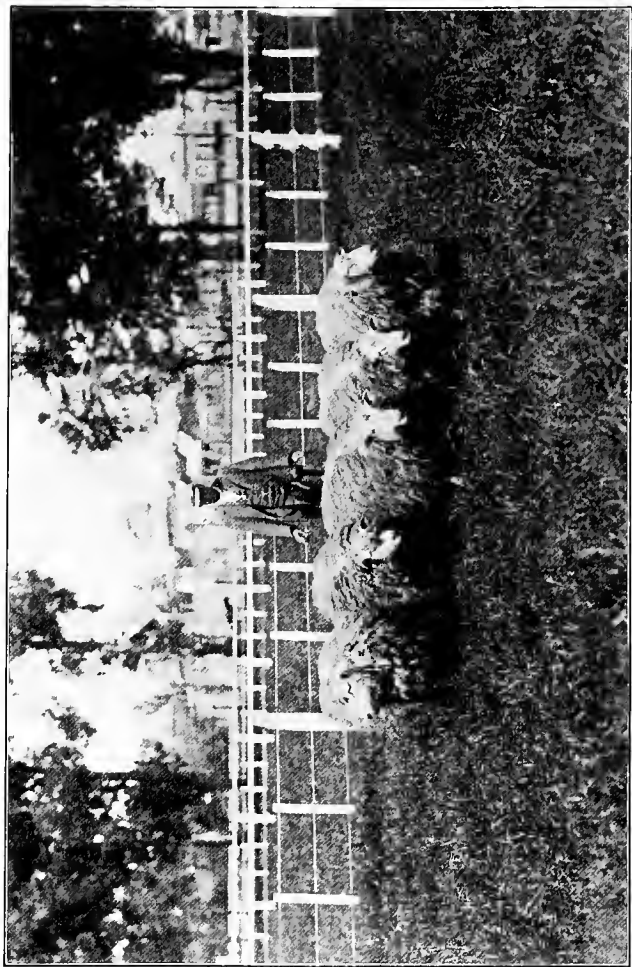


FIG. 129. The common type of sheep in Argentina is the long wool.

production of cultivated crops, the value of the exports of these two classes of products is nearly equal. About three-fourths the wheat and one-half the maize raised are exported, while flaxseed is one of the largest individual items of export. Wool, hides and skins constitute the principal exports of animal products, although refrigerator beef and mutton, jerked beef, extracted beef, tallow and butter are important items. The export of live cattle has declined in recent years on account of the prevalence of foot and mouth disease.

The principal exports of Chile are mineral products, but in the other three countries they are almost exclusively agricultural, as above indicated. Forests of wild holly (*Yerbales*) exist in Paraguay and northern Argentina. The leaves are gathered for the production of "yerba mate," or Paraguayan tea, which is largely used in South America. Permits for the formation of camps for working "yerba mate" are granted by the government. All the work in connection with this crop is done by women. Although large areas of "Yerbales" exist in these countries, the supply gathered does not equal the demand, large quantities being imported from Brazil.

The area of the four countries of southern South America, which is about one-half that of Brazil or the United States, exclusive of Alaska, may be divided roughly into three nearly equal parts. One-third is estimated to be arable and suited to cultivated crops; about one-third is suited only to grazing, chiefly on account of the rainfall, while one-third is occupied by mountains, forests or land too arid to support any form

of agricultural activity. While in Paraguay and in northern Argentina there are rather dense forests of considerable value, the amount of forest is relatively



FIG. 130. A "gaucho" or horseman of the estancia, Argentina.

small. Aside from the mountains and forests mentioned, the area is largely a level or rolling, treeless prairie, comparable to the Mississippi Valley in the fertility and character of the soil, and the ease with which large tracts may be cultivated and transportation facilities developed. It having been possible in the past to purchase land in large bodies at a nominal cost, a large part of the land devoted to grazing, unlike the United States, except Texas, has been fenced. The typical farm enterprise in this region, and especially in Argen-

tina, is a ranch or stock farm, known under the name of "estancia."

In these countries the word "estancia" is used to refer to a body of land under a single ownership and representing, in general, a single management, although a number of families called "colonos" may conduct, independently, farm operations of similar or diverse kinds thereon. The "colonos" are furnished land, implements, and a certain amount of food. They are permitted to raise crops for two years, the landlord receiving fifteen per cent. At the end of this period the land must be left in alfalfa. The owner then uses the land for grazing. While varying from 2,000 to 700,000 acres, a typical or average estancia is esti-



FIG. 131. Many high-bred sires have been imported to Argentina.

mated at 10,000 acres. The following is a general description of this management:

"The property is fenced in and divided by wire fences into paddocks—varying in area from 200 to 6,000 acres and having one, two or more wells and troughs for watering stock—when the property is not crossed by streams—a given number of which are used exclusively for breeding stock, whilst those yielding the best pastures are reserved for fattening and the remainder for tillage or for dairy cattle. The head station or 'estancia' house is generally located, more or less, in the center of the property, is usually surrounded by an orchard, vegetable garden, flower garden and by plantations of timber and ornamental trees, and comprises the owner's and manager's houses; laborer's or 'peon's' quarters; the barns for storing machinery, implements, hides, wool, grain, etc., the shearing shed; the stables or barns for pure-bred breeding stock; the sheep dip; coach- and harness-houses, the poultry-house, etc. Cattle are kept in separate paddocks, according to sex and age, and are worked and locked after from the central station; pure-bred stud herds and flocks are reared in paddocks adjoining the central station; sheep are kept in flocks of from 1,200 to 2,000 head and are shepherded by men (who are paid a monthly wage or else receive 25, 30, 40 or 50 per cent of the produce of the flock) living with their families in detached houses, generally located just within the limits of the property or on the division lines of the paddocks.

"All breeding 'estancias' keep cattle, sheep and horses, there being hardly any where one kind of stock

is exclusively kept. Only sufficient sheep for home consumption and as small a number as possible of horses are kept at 'estancias' where cattle fattening is the main object. When dairying forms part of the work of a breeding or fattening 'estancia,' milch cows are kept in herds of 150 to 250 by dairymen who have charge of the care and milking of each herd, and get from 40 to 50 per cent of the profits obtained by the sale of milk or cream forwarded daily to creameries, butter factories or to retail sellers of dairy products. When agriculture is combined with animal industry it is generally carried on by families who work paddocks of 125, 250, 500 or 750 acres of land; are supplied with the necessary implements, machinery and working animals and receive half the crop. Sometimes the 'estanciero' provides only the land and working animals and receives 10, 15 or 20 per cent of the crop—paying the threshing expenses of his share."¹

The mean annual temperature varies from 73° Fahr. on the north to 41° Fahr. on the south. The variation between summer and winter temperature is less than in most parts of North America. For example, the maximum temperature at Buenos Aires is 103° Fahr. and the minimum 28° Fahr. Except in the Andes and in the southern portion, freezing weather seldom occurs and snow is almost unknown. At Buenos Aires the average temperature for January (midsummer) is 75° Fahr.; for July (midwinter) 50° Fahr. At Staten Island, at the extreme southern end of the region, it is 48° Fahr. and 37°

¹Sketch of the Argentine Republic, pp. 82, 83. Department of Agriculture: Buenos Aires. 1904.

Fahr.; while at Asuncion, in Paraguay, it is 80° Fahr. and 66° Fahr., respectively. The warmest and best watered portion of the region is in Paraguay and north-eastern Argentina, while westward toward the Andes and southward the region is cooler and drier.

The area can be divided, from the standpoint of temperature, into three parts. North of the thirtieth parallel, south latitude, with the exception of the Andean region, the country is warm. Between the thirtieth and fortieth parallels the climate is temperate, while south of the fortieth parallel the climate is cold. In Paraguay the rainfall reaches sixty or more inches, but westward and southward the rainfall rapidly decreases until an annual rainfall of less than fifteen inches is reached. North of the fortieth parallel there is a wet and a dry season, the former occurring in the summer months. In the northern portion the proportion of summer rainfall to winter rainfall is high, but this difference gradually disappears until the fortieth parallel is reached, when the rainfall is equally divided between summer and winter. Wide annual variations in rainfall occur, frequently causing destruction to crops. While the water for domestic purposes is generally good in the better watered sections, in the arid and semi-arid section, the lack of water and the occurrence of alkali often cause the stock-raisers much trouble. In the temperate zone, which includes Uruguay and the most thickly settled portion of Argentina and Chile, the climate is healthful as well as delightful. With the exception of Chile, these countries raise a large surplus of agricultural products. A rather large proportion of the people,

however, live in cities, and make a market for high-class agricultural products.

The natural conditions with regard to transportation are excellent, the land being comparatively level and the Plata River and its tributaries, whose drainage-basin rivals that of the Mississippi and its tributaries, furnishing water transportation of a rather high order, although docking facilities are poor on account of shallow water. Thus far, railway transportation has not been adequate to the development of the cultivated area, but is now being rapidly extended. Wheat, maize and flaxseed are hauled as much as thirty miles to railway stations. The public highways are but little improved. The connection of the Atlantic and Pacific oceans by means of a railway from Buenos Aires and Valparaiso may have considerable influence upon commerce. The freight rates are high, compared to those of the United States, and grain elevators do not exist inland, the grains being handled in bags, thus adding to the cost of marketing.

Thus far the cultivated area and the population of Argentina are restricted largely to the proximity of points of export. About two-thirds of the population and about eight-ninths of the cultivated area of Argentina are in the Federal District (City of Buenos Aires) and the provinces of Buenos Aires, Santa Fé, Entre Rios and Cordoba. The section occupies about one-third the total area of Argentina. The cultivated area in Uruguay, Paraguay and Chile is comparatively small, stock-raising being the chief industry.

The population of the temperate South American

countries is almost entirely Caucasian, mostly of the Latin race. Many of the native Argentinians have descended from the Basques, a hardy race from the Pyrenees of supposed Celtic origin. At present the immigration is mostly from Italy and Spain. Recently there has been quite an immigration of Boers from South Africa. The proportion of Anglo-Saxons, however, is larger than elsewhere in South America. The per cent of illiteracy is also lower.

The improvements occupied by the proprietor of an "estancia" is often of a lordly character, but the conditions of employees and of tenants are likewise not infrequently of an unsatisfactory and primitive character. It not being necessary to make any special provision for winter, the tenant is content with a mere shack for a home. Since two-thirds of the cultivated area is farmed by tenants, the social condition of tenants and of the small farmers is not comparable to that of the United States. Throughout the regions of arable land, the government takes special pains to protect the wooded areas, in order that the supply of wood for farm purposes shall not become exhausted.

"Land for agriculture has rapidly risen in value during the past three or four years, but may still be had for from \$5 to \$15 per acre, depending largely upon the distance from the railway station and from the seaboard. Good land within four to eight miles of a railway station and 100 to 300 miles from the seaboard may be had for \$10 to \$15 per acre. It will be disappointing, however, to any North American small farmer who goes there alone. The country is no place for a poor

man. The writer has had many inquiries from young men in the United States who thought Argentina was a good place to go to get a start. The conditions of labor are such that the start should be made under more democratic conditions. The line is drawn very sharply between the rich and the poor, and the gap is very wide. The opportunities of the western United States do not exist there. A North American farm hand would not submit to the treatment or the associations he would find in Argentina. Agriculture and stock-raising, especially the latter, are conducted on a very large scale. The man of small capital has comparatively little chance. If an organization of farmers from the United States should go to Argentina and introduce improved methods, success would doubtless follow, if local conditions were studied and understood before investments were made. Great opportunities exist for profitable investment in the development of the resources of the country, but the greatest prudence must be exercised and care taken to know in advance how to avoid the difficulties that beset the stranger in a strange land."¹

The area in cultivated crops is only about one-tenth of the total area of the region under consideration. While there are still vast areas of public land, the amount of land under private ownership is much greater, probably many times greater, than the cultivated area. The government lands suited to cultivated crops are sold in various sized lots, depending upon their suitability to cultivated crops or grazing: lots

¹ U. S. Dept. of Agr., Year-book 1904, p. 285 ("Agricultural Development in Argentina," Frank W. Bicknell).

vary in extent from 250 acres to 50,000 acres. The law fixes the minimum price, while the maximum price is determined by auction or by the government. The value of lands depends largely upon their accessibility to market, fertility being the next consideration, while improvements are of little consequence.

The character, extent and economy of production of the agricultural products of the countries of temperate South America make them a direct competitor of the United States. Western Canada and Argentina contain the only large bodies of land in the world whose development appears likely in the near future to supply the increasing demand for wheat. The agriculture of these South American countries has reached a stage where it will progress with great rapidity. Hereafter they will occupy a large place in the world's markets.

APPENDIX

HOW TO SECURE TITLE TO PUBLIC LANDS

UNITED STATES

IN order that the prospective settler may have some definite notion of the method of procedure in obtaining title to public land, it is proposed to give below the steps essential thereto. To this end, liberal use has been made of certain publications of the General Land Office, Washington, D. C.

First of all, one should seek to determine, by all means available, where one wishes to locate. Having determined upon the state or territory, it is then desirable to select the tract. For this purpose, it is necessary to secure a list of vacant lands, and specific descriptions of the character of the land, climate, water or timber, which may be had by applying to the local land office of the district in which the lands are situated. A township diagram showing entries already made in a certain township can be procured by sending one dollar to the register and receiver of the land office for that district. The diagram required should be specified by township and range number. In no case is it wise for the prospective settler to select a tract without having first given it a personal inspection. If, upon inspection, the land appears suitable to the purpose of settlement, entry therefor can be made at the local land

office, where full particulars pertinent thereto may be obtained. It should be borne in mind that selection of a tract once made and application for entry once filed, the same cannot be rescinded and changed, except on conditions specified by the General Land Office and according to the discretion of the Commissioner. Full information regarding vacant lands in any district may be obtained, before inspection, from the register and receiver of the district local land office.

All vacant, unappropriated public lands non-mineral and non-saline in character are subject to entry under the homestead laws. On September 22, 1905, the area of vacant, unappropriated public land, excluding Alaska, was, according to a statement issued from the General Land Office, approximately 460,000,000 acres. This does not represent all the land that is for sale in the United States. Various railway companies have received grants of land for the construction of railways. In certain states every other section for a given distance from the railway has been thus acquired. Letters addressed to the land agent at the main offices of the railway company concerned will generally receive prompt attention. In addition to the public and railway lands, a large number of farms in all the older settled states is constantly coming on the market. This latter source of land is, in the aggregate, large. In some states a public bureau publishes lists of farms for sale, with a brief statement of their principal features, while numerous real estate agents publish similar lists. The following table, taken from the Report of the Secretary of the Interior, gives by states and territories an ap-

proximate estimate of the reserved as well as the unappropriated public lands in the public-land states and territories at the close of the fiscal year June 30, 1904:

RESERVED AND UNAPPROPRIATED PUBLIC LANDS

STATE OR TERRITORY	Area unappropriated and unreserved			Area reserved	Area appropriated
	Surveyed	Unsurveyed	Total		
Alabama	219,730	.....	219,730	51,480	32,386,710
Alaska .....	.....	368,035,975*	368,035,975	67,705	.....
Arizona	12,064,793	34,936,800	47,001,593	20,249,180	5,541,547
Arkansas	2,427,857	.....	2,427,857	2,560	31,113,263
California ...	28,077,190	7,136,603	35,213,793	0,818,779	43,937,348
Colorado	31,733,053	4,098,543	35,831,596	5,294,348	25,222,216
Florida	997,777	160,070	1,157,847	19,259	33,895,534
Idaho	10,848,849	28,819,787	39,668,636	2,061,577	11,563,227
Illinois .....	.....	.....	.....	.....	35,842,560
Indiana .....	.....	.....	.....	.....	22,950,400
Indian Ter. ...	.....	.....	.....	19,714,560	.....
Iowa .....	.....	.....	.....	.....	35,646,080
Kansas	947,642	.....	947,642	120,375	51,314,703
Louisiana	102,173	65,018	167,191	1,468,434	27,419,735
Michigan	340,507	.....	340,507	120,654	36,358,039
Minnesota ...	2,243,210	884,198	3,127,408	2,346,820	45,723,852
Mississippi ...	92,420	.....	92,420	.....	29,592,700
Missouri	191,681	.....	191,681	.....	43,604,159
Montana	18,409,023	38,046,412	56,455,435	18,616,446	18,521,719
Nebraska	7,822,789	11,974	7,834,763	628,855	40,673,662
Nevada	30,833,050	30,417,530	61,250,580	5,983,409	3,102,651
New Mexico ..	38,123,606	14,128,734	52,252,340	7,356,104	18,820,356
North Dakota	7,795,095	3,302,356	11,097,451	2,686,690	31,125,939
Ohio .....	.....	.....	.....	.....	26,062,720
Oklahoma ...	2,095,427	.....	2,095,427	3,055,469	19,567,824
Oregon	14,527,289	5,646,965	20,174,254	14,894,967	26,208,219
South Dakota	10,413,471	306,831	10,720,302	12,225,989	26,260,109
Utah	11,560,475	28,142,991	39,703,466	7,750,479	5,087,495
Washington ...	4,008,954	4,853,978	8,862,932	11,395,331	22,488,617
Wisconsin ...	71,373	.....	71,373	432,524	34,770,983
Wyoming	34,320,326	2,609,852	36,930,178	15,511,085	9,992,017
Grand total.	270,267,760	571,604,617	841,872,377	172,873,079	794,794,384

*The unreserved lands in Alaska are mostly unsurveyed and unappropriated.

The various district land offices are given below. Any vacant tracts of public land in states having no land office may be entered at the General Land Office subject to the provisions of the public land laws.

ALABAMA: Montgomery; ALASKA: Juneau; ARIZONA: Phoenix; ARKANSAS: Camden, Dardanelle, Harrison, Little Rock; CALIFORNIA: Eureka, Independence, Los Angeles, Redding, Sacramento, San Francisco, Stockton, Susanville, Visalia; COLORADO: Del Norte, Denver, Durango, Glenwood Springs, Gunnison, Hugo, Lamar, Leadville, Montrose, Pueblo, Sterling; FLORIDA: Gainesville; IDAHO: Blackfoot, Boise, Cœur d'Alene, Hailey, Lewiston; IOWA: Des Moines; KANSAS: Colby, Dodge City, Topeka; LOUISIANA: Natchitoches, New Orleans; MICHIGAN: Marquette; MINNESOTA: Cass Lake, Crookston, Duluth, St. Cloud; MISSISSIPPI: Jackson; MISSOURI: Springfield; MONTANA: Bozeman, Great Falls, Helena, Kalispell, Lewiston, Miles City, Missoula; NEBRASKA: Alliance, Broken Bow, Lincoln, North Platte, O'Neill, Sidney, Valentine; NEVADA: Carson City; NEW MEXICO: Clayton, Las Cruces, Roswell, Santa Fé; NORTH DAKOTA: Bismarck, Devil's Lake, Dickinson, Fargo, Grand Forks, Minot; OKLAHOMA: Alva, Elreno, Guthrie, Kingfisher, Lawton, Mangum, Woodward; OREGON: Burns, La Grande, Lakeview, Portland, Roseburg, The Dalles; SOUTH DAKOTA: Aberdeen, Chamberlain, Huron, Mitchell, Pierre, Rapid City, Watertown; UTAH: Salt Lake City, Vernal, WASHINGTON: North Yakima, Olympia, Seattle, Spokane, Vancouver, Walla Walla, Waterville; WISCONSIN: Wausau; WYOMING: Buffalo, Cheyenne, Douglas, Evanston, Lander, Sundance.

Assuming that a person wishes information concerning public land open for settlement near Lander, Wyoming, he would address his letter as follows:

Register and Receiver

U. S. Local Land Office

Lander, Wyo.

There are two classes of public lands: (1) "minimum lands," selling at the minimum price of \$1.25 per acre; and (2) "double minimum lands," selling at the minimum price of \$2.50 per acre. Alternate reserved sections within the limits of railroad grants are double minimum in price, except in cases of special legislation. It must be noted that these are the lowest prices at which lands may sell, and are not to be taken as the invariable purchase price of any of the lands which may command higher prices at public or private sale.

There is given below a statement of some of the lands offered for entry under existing congressional acts, including a brief description and price. Where the price is not stated, it must be construed as minimum or double minimum. There are other laws relating to right of way for railroads, mission claims in Alaska, mining claims, bounty lands, railroad adjustments, town sites, including town sites in Alaska, timber depredations, and other special matters, which form the subject of separate circulars, any of which may be procured from the Commissioner of the General Land Office in Washington, D. C.

(1) *Homestead*.—Excerpts of the law are hereinafter stated.

(2) *Agricultural Lands*.—The acquisition of title under the agricultural public land laws by any person is restricted to 320 acres in the aggregate. This is in accordance with the act of August 30, 1890, and is to be construed that all applicants to file or enter under any of the land laws of the United States, must show that since August 30, 1890, they had not acquired title

to, nor are they claiming under any of the agricultural public land laws, an amount of land which, together with the land sought to be entered, will exceed in the aggregate 320 acres. In grazing districts, stock-raising and dairy production are so nearly akin to agricultural pursuits as to justify the issue of patent upon proof of permanent settlement and the use of the land for such purposes.

(3) *Desert Lands*.—In California, Oregon, Nevada, Washington, Montana, Utah, Arizona, New Mexico, Wyoming and the Dakotas. What may be considered desert land is subject to the discretion of the Commissioner of the General Land Office. Maximum, 320 acres; expenditure of at least one dollar per acre annually for three years for reclamation of the land, payment of twenty-five cents per acre at time of application, and one dollar additional within three years.

(4) *Timber and Stone Lands*.—In any of the public land states. They must be unreserved, unappropriated, uninhabited, and without improvements (except for ditch for canal purposes) save such as were made by or belong to the applicant. Saline and mineral lands are not subject to entry under this law. Maximum, 160 acres in one body.

(5) *Saline Lands*.—In states which have had saline grants, the land containing salt springs, or deposits of salt in any form sufficient to render it chiefly valuable therefor, under the provisions of the law relating to the placer mining claims. Price not less than \$1.25 at public auction or private sale, under regulations prescribed by the Commissioner of the General Land Office.

Excerpts from the homestead laws are quoted:

"Every person who is the head of a family, or who has arrived at the age of twenty-one years, and is a citizen of the United States, or who has filed his declaration of intention to become such, as required by the naturalization laws, shall be entitled to enter one quarter-section, or a less quantity, of appropriated public lands, to be located in a body in conformity to the legal subdivisions of the public lands; but no person who is the proprietor of more than one hundred and sixty acres of land in any state or territory shall acquire any right under the homestead law.¹ And every person owning and residing on land may, under the provisions of this section, enter other land lying contiguous to his land, which shall not, with the land so already owned and occupied, exceed in the aggregate 160 acres.

"Any person applying to enter land under the preceding section shall first make and subscribe before the proper officer and file in the proper land office an affidavit that he or she is the head of a family, or is over twenty-one years of age, and that such application is honestly and in good faith made for the purpose of actual settlement and cultivation, and not for the benefit of any other person, persons or corporation, and that he or she will faithfully and honestly endeavor to comply with all the requirements of law as to settlement, residence and cultivation necessary to acquire title to the land applied for; that he or she is not acting as agent of any person, corporation or syndicate in making such entry, nor in collusion with any person, corporation or syndicate to give them the benefit of the land entered, or any part thereof, or the timber thereon; that he or she does not apply to enter the same for the purpose of speculation, but in good faith to obtain a home for himself, or herself, and that he or she has not directly or indirectly made, and will not make, any agreement or contract in any way or manner, with any person or persons, corporation or syndicate whatsoever, by which the title which he or she might acquire from the Government of the United States

¹ Under the Kinkaid act of April 28, 1904, homestead entries in certain portions of Nebraska may consist of 640 acres.

should inure, in whole or in part, to the benefit of any person, except himself, or herself, that since August 30, 1890, he or she has not acquired title to; nor is he or she claiming under any of the agricultural public land laws, an amount of land which, together with the land he or she is seeking to enter, will exceed in the aggregate 320 acres, and that he or she has not theretofore had the benefit of the homestead laws. The applicant must pay the legal fee of five dollars when the entry is not more than eighty acres, and ten dollars when the entry is for more than eighty acres, and a commission, at the time of entry, of one per centum on the cash price of the land applied for, and a like commission when the claim is finally established, and the certificate therefor issued as a basis of a patent."

The law regarding majority of age does not apply to minors who have served in the United States Army or Navy, regular or volunteer, for a period of not less than fourteen days during the existence of an actual war.

Applications for homestead entry must be made on a form provided by the local land office of the district in which the land applied for is located, and filed in that office, accompanied by the fees and affidavits pertinent thereto. These requirements satisfied, the matter will be recorded and reported to the General Land Office.

In case of simultaneous applications by two or more parties to enter the same tract of land, the land is awarded to the party who has made actual settlement and improvement, or to the one who has made prior actual settlement and improvement. if disputed, or, if there are no improvements, to the highest bidder. Within six months after making entry, the homestead party must actually inhabit the land and make it the home of himself and family, as well as improve and cultivate it continuously for the term of five years.

A homestead settler on unsurveyed public land not yet open to entry must make entry within three months after the filing of the township plat of survey in the district land office. Settlers within railroad limits who have purchased from a railroad company lands in railroad sections, which are afterwards for any cause restored to the public domain, are entitled to make entry of the lands so occupied by them under the general provisions of the settlement laws. Purchase may be made three months after restoration at \$2.50 per acre. Upon proof of actual residence, improvement and cultivation for not less than fourteen months from date of settlement, a homestead settler, in case he does not wish to remain five years on a tract, may pay for it with cash. This commutation, however, does not excuse the party from living upon, improving and cultivating the land for the required period.

The time of payment for entries may be extended not to exceed one year from date when the same falls due, provided evidence of inability to meet the payment conforms to the regulations of the Secretary of the Interior. This does not apply to a commuted homestead entry. Indians may secure entries for homesteads like any other persons, except that they are not required to pay any fees or commissions; their lands, likewise, are not subject to sale, assignment, lease or incumbrance. Under the law, only one homestead privilege is granted to one individual.

Land may be purchased outright in tracts from a quarter quarter-section to entire sections when offered at private sale, or in half quarter-sections when offered

at public sale, according to the provisions of the local land office. All patents issuing from the General Land Office are issued in the name of the United States, are signed by the President, and countersigned by the recorder of the General Land Office, and are recorded in that office in books kept for the purpose. Patents for lands entered or located under general laws can be issued only in the name of the party making the entry or the location, or, in case of his death before making proof, to the statutory successor making the proof as provided by law.

In case an application for entry is rejected, notice being given the applicant to that effect from the district land office, he has the right to appeal to the Commissioner of the General Land Office through the district land office, where appeals must be filed in writing. For this purpose, forty days in all are allowed,—five days for transmission to the applicant of notice of rejection, thirty days for his consideration of the rejection, and five days for transmission of the appeal therefrom to the district land office. The General Land Office will consider appeals only when they are submitted through the district land office as just cited. Appeals from the decision of the Commissioner of the General Land Office, except in specified matters resting in the sound judgment of the Commissioner, should be made to the Secretary of the Interior, whose decision is final so far as respects the action of the Executive. On this point, see Rules of Practice (31 L. D. 527 et seq.).

Irrigated Lands.—The new government reservoirs which are being built in various western states, as

shown on pages 389 and 390, will bring into the market a considerable area of land for the sale of which special laws have been enacted. For the benefit of any who have settled, or who may contemplate settling, in regions where irrigation is necessary, there are given below excerpts from the text of the reclamation act of June 17, 1902:

SECTION 1. All moneys received from the sale and disposal of public lands in Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington and Wyoming, beginning with the fiscal year ending June 30, 1901, including the surplus of fees and commissions in excess of allowances to registers and receivers, and excepting the five per centum of the proceeds of sales of public lands in the above states set aside by law for educational and other purposes shall be, and the same are hereby reserved, set aside and appropriated as a special fund in the treasury, to be known as the "reclamation fund," to be used in the examination and survey for and the construction and maintenance of irrigation works for the storage, diversion and development of waters for the reclamation of arid and semi-arid lands in the said states and territories, and for the payment of all other expenditures provided for in this act. . . .

SEC. 5. The entryman upon lands to be irrigated by such works shall, in addition to compliance with the homestead laws, reclaim at least one-half of the total irrigable area of his entry for agricultural purposes, and, before receiving patent for the lands covered by his entry, shall pay to the Government the charges apportioned against such tract, as provided in Section 4. No right to the use of water for land in private ownership shall be sold for a tract exceeding 160 acres to any one landowner, and no such sale shall be made to any landowner unless he be an actual bona fide resident of such land, or occupant thereof residing in the neighborhood of said land; and no such right shall permanently attach until all payments therefor are made. The annual instal-

ments shall be paid to the receiver of the local land office of the district in which the land is situated, and a failure to make any two payments when due, shall render the entry subject to cancellation, with the forfeiture of all rights under this act, as well as of any moneys already paid thereon. All moneys received from the above sources shall be paid into the reclamation fund. Registers and receivers shall be allowed the usual commissions on all moneys paid for lands entered under this act.

SEC. 6. The Secretary of the Interior is hereby authorized and directed to use the reclamation fund for the operation and maintenance of all reservoirs and irrigation works constructed under the provisions of this act: *Provided*, That when the payments required by this act are made for the major portion of the lands irrigated from the waters of any of the works herein provided for, then the management and the operation of such irrigation works shall pass to the owners of the lands irrigated thereby, to be maintained at their expense under such form of organization and under such rules and regulations as may be acceptable to the Secretary of the Interior: *Provided*, That the title to and the management and operation of the reservoirs and the works necessary for their protection and operation shall remain in the Government until otherwise provided by Congress.

SEC. 8. Nothing in this act shall be construed as affecting or intended to affect, or to in any way interfere with, the laws of any state or territory relating to the control, appropriation, use or distribution of water used in irrigation, or any vested right acquired thereunder, and the Secretary of the Interior, in carrying out the provisions of this act, shall proceed in conformity with such laws, and nothing herein shall in any way affect any right of any state or of the Federal Government or of any landowner, appropriator or user of water in, to or from any interstate stream or the waters thereof: *Provided*, That the right to the use of water acquired under the provisions of this act shall be appurtenant to the land irrigated, and beneficial use shall be the basis, the measure and the limit of the right.

DOMINION OF CANADA

Public lands in Canada, collectively known as Crown Lands, are of three kinds: (1) Dominion Lands, controlled by the Dominion Government; (2) the Provincial Crown Lands, controlled by the provinces within whose limits they occur; (3) lands owned by railway companies. The following land regulations obtain:

(1) All surveyed even-numbered sections (except 8 and 26) are reserved exclusively for homesteads. Homestead entry for 160 acres may be obtained by the sole head of a family, or by a male eighteen years or over, on payment of ten dollars to the local agent of Dominion Lands. Actual residence upon, and cultivation of, the land must begin within nine months, at the most, after entry; and residence must continue three years, during which six months of each year must be devoted to residence upon, and cultivation of, the land. Provisions exist whereby one may qualify for residence without actually residing upon the homestead. Patent to the land may be secured, also, by purchase at the government price at the time of entry, provided the homesteader resides twelve months upon the land after entry and brings thirty acres under cultivation. If in need of funds for settlement, the settler may create a charge of not to exceed \$600 with interest not to exceed 8 per cent by the government, payment of interest being made within a reasonable time.

The odd-numbered sections are reserved for land subsidies in aid of the construction of colonization railways in Manitoba, Alberta and Saskatchewan. Payments may be made in cash or government scrip.

A homesteader, whose land is destitute of timber, may obtain timber (1) by payment of an office fee of twenty-five cents, securing from the Crown Timber agent permits to cut timber for fuel and farm improvements; (2) by purchase of a wood lot, not to exceed twenty acres; (3) by bidding to cut on surveyed or unsurveyed lands.

The price per acre of coal land is: lignite or bituminous coal, \$10; for anthracite, \$20. A royalty of ten cents per two thousand pounds is collected on coal mined.

(2) All mineral lands, except coal lands, are under the jurisdiction of the Provincial Government; all, including gold and silver, within Indian reserves, are administered by the Department of Indian Affairs.

Government lands are open for settlement at prices ranging from twenty-five cents to one dollar per acre, according to province. In New Brunswick, hay and timber lands are open only to lease. Full particulars are available from the Commissioner of Crown Lands, Toronto, or from the Superintendent of Immigration, Ottawa, Canada.

(3) Railway lands sell at from one to ten dollars per acre. Railways controlling such lands, with their official address, are as follows: British Columbia Lands Commissioner, Canadian Pacific Railway Company, Calgary, Alberta; the Qu'Appelle, Long Lake and Saskatchewan Railway Company, Winnipeg, Manitoba (or Saskatchewan Valley Land Company, 305 Jackson Street, St. Paul, Minnesota); the Calgary and Edmonton Railway Company, Winnipeg, Manitoba.¹

¹ Abstract from the Statistical Year-book of Canada, 1904, pp. 70-82.

ESSENTIALS IN THE SALE AND TRANSFER OF REAL ESTATE

Having selected a piece of land and agreed upon the price, there are certain transactions or formalities which must be complied with before sale is complete. A mere promise to sell or purchase real estate is not legally binding. Even where there is a contract in writing signed by both parties, legal title does not pass to the purchaser, although equity for many purposes regards the title to have passed to the purchaser and may compel the seller to execute a conveyance.

The purchaser should require of the seller evidence that the title to the land is straight and clear; if not, exactly what the defects are. This is done through an abstract of title, which should be prepared by a lawyer in whom you have confidence. This is not an official document, and its value depends largely upon the ability and carefulness of the party making the abstract.

Lands are conveyed by means of a deed. A deed is a written instrument conveying at least a life interest in the land. Care should be taken that the deed contain the essential parts and that it is properly executed.

Deeds are of two kinds:

QUIT CLAIM deeds, those which convey all the rights, title and interest which the seller has in the land, but does not warrant the title, and

WARRANTY deeds, which, in addition to what a *quit claim* deed does, contains *covenants* which agree that the seller and his heirs, etc., shall warrant and defend the title to the purchaser against the lawful claims of

all persons. The requisites of a deed are the parties to the deed, the words of conveyance, the consideration, the description, and, with a *warranty* deed, the covenants. Many states provide by statute for a short form of deed, which shall be deemed to carry with it all the covenants.

The seller must be of full age, sound mind and, if married, his wife should always join in the deed. Her name should appear following his at the beginning of the deed, she should sign and acknowledge the deed, and the certificate of acknowledgement should state that she is the wife of the seller. If the seller is a married woman, her husband does not need to join in the sale of her own property.

It is customary to state the consideration upon which the deed is given, but this is not necessary, nor will a false statement as to amount paid invalidate the deed.

The description of the land conveyed should be as minute and accurate as possible, and preferably in the exact language of former deeds. In case former description is in error, it should be referred to and correct description given.

Where land is conveyed by metes and bounds this description governs, although it may not convey the number of acres of land stated. In describing boundaries, the location of monuments takes precedence of distances mentioned.

A deed must be signed, witnessed, acknowledged, delivered and recorded. In some states deeds must be sealed, but in other states the law has dispensed with this formality. Witnesses are not required in all states.

Some states require one, but usually two witnesses are required.

The parties signing the deed are required to appear before an official designated by statute, usually any magistrate, justice or notary public, and acknowledge the same to be his or her free act and deed. A deed has no effect until delivered, and should be immediately recorded by the purchaser. Generally an unrecorded deed is not good as against a subsequent purchaser in good faith.

It is well to note that the laws relating to the transfer of land are those of the place where the land lies and not necessarily those of the place where the deed is made.

METHOD OF LAYING OUT PUBLIC LANDS

The public lands of the United States are, whenever practicable, laid out into townships each six miles square, "as near as may be," whose sides run due north and south and east and west. The townships are laid off north and south of a base line which is a parallel of latitude, and are numbered north and south from the base line: thus, T. 3. S., means Township No. 3 South from the base line. Each row of townships running north and south is called a range, and is numbered east or west of the principal meridian: thus, R. 2. E., means Range 2 East of the given meridian.

The townships are then laid off into sections or square miles of 640 acres "as near as may be," and these are numbered, beginning always at the northeast section, as shown in the diagram on following page.

Each quarter-section is referred to as the northeast or southwest quarter of the section, and each forty acres as the northwest or southeast quarter of a particular

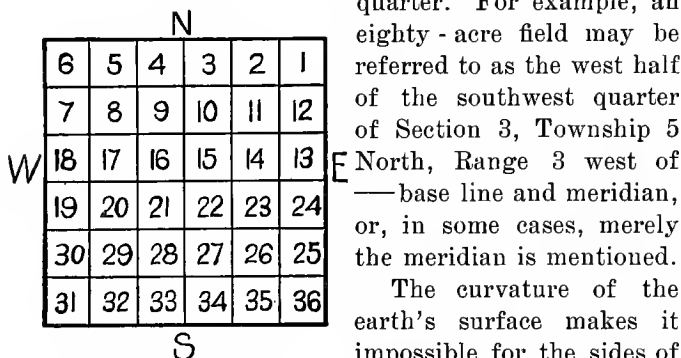


FIG. 132. Township diagram.

quarter. For example, an eighty-acre field may be referred to as the west half of the southwest quarter of Section 3, Township 5 North, Range 3 west of —base line and meridian, or, in some cases, merely the meridian is mentioned. The curvature of the earth's surface makes it impossible for the sides of townships to be truly north and south and at the same time six miles square. The excesses and the deficiencies due to the convergency of meridians and the curvature of the earth are by law added to or deducted from the western and northern ranges of sections and half-sections of the townships. While the above has been the rule in laying out public lands for more than a century, still there are many exceptions due to many causes.

In the older settled sections, the land was laid out in lots often in a very irregular manner, although in some cases within a given tract there was more or less regularity. In these cases, the land must be described minutely and carefully by metes and bounds. In some of the southern and western states, also, where there were Spanish grants, much irregularity in the surveys

exists. Over much of the North Central states this rectangular system of laying out lands obtains, and has worked well in most respects.

IRRIGATION PROJECTS

Below is given a table showing the irrigable lands in public and private ownership which will eventually be reclaimed by the irrigation projects under consideration and construction by the Reclamation Service of the United States Geological Survey, according to the latest official statement (January, 1906).

In some cases, actual construction has not yet begun, and in only a few cases are the lands open for settlement. In a number of instances, the land in the project is all under private ownership, or has been filed upon. In other cases, it is usually open to homestead entry in lots of forty or eighty acres. In some instances, the cost of the water right has been fixed at twenty-six dollars per acre, payable in ten annual instalments without interest. Statement concerning the progress of the work is published from time to time, and may be had free by applying to the Reclamation Service, United States Geological Survey, Department of the Interior, Washington, D. C. Local information concerning these lands can, when organized, be obtained through the association having charge of the distribution of water, collection of payments and maintenance charges, as follows:

IRRIGATION PROJECTS

STATE OR TERRITORY.	Project.	Estimated acres to be brought under irrigation.	Address for local information.
Arizona.....	Salt River ..	160,000	Salt River Valley Water Users' Ass'n, Phoenix, Ariz.
California ...	Yuma	101,000	Yuma County Water Users' Association, Yuma, Ariz.
Colorado.....	Uncompahgre Valley	.....	Uncompahgre Valley Water Users' Association, Montrose, Colo.
Idaho.....	Minidoka....	130,000	United States Local Land Office, Boise, Idaho.
Idaho.....	Payette-Boise	350,000	Water Users' Association, Caldwell, Idaho.
Kansas	Garden City.	8,600	Finney County Water Users' Ass'n, Garden City, Kans.
Montana	Huntley.....	30,000	United States Local Land Office, Miles City, Mont.
Nebraska-Wyoming..	North Platte	.....	North Platte Valley Water Users' Association, Scotts Bluff, Neb.
Nevada	Truckee-Carson....	350,000	United States Local Land Office, Carson City, Nev.
New Mexico..	Hondo	10,000	Rio Hondo Water Users' Association, Roswell, N. Mex.
New Mexico..	Carlsbad	15,000	Water Users' Association, Carlsbad, N. Mex.
New Mexico-Texas.....	Rio Grande..	180,000	.....
North Dakota-Montana...	Lower Yellowstone ..	66,000	U. S. Local Land Office, Miles City, Mont. and Lower Yellowstone Water Users' Ass'n, Ridgeline, Mont.
Oregon	Umatilla	20,000	.....
Oregon-California.....	Klamath	236,402	U. S. Local Land Office, Susanville, Cal., and Klamath Water Users' Ass'n, Klamath Falls, Ore.
South Dakota	Belle Fourche	60,000	United States Local Land Office, Rapid City, S. Dak. and Belle Fourche Water Users' Association, Belle Fourche, S. Dak.
Utah.....	Strawberry Valley	50,000	Strawberry Valley Water Users' Association, Spanish Fork, Utah.
Washington..	Okanogan...	8,650	.....
Wyoming	Shoshone ...	175,000	.....

AREA SURVEYED AND MAPPED BY THE BUREAU OF SOILS,
TO THE YEAR ENDED JUNE 30, 1905

Place	Acres	Place	Acres
Alabama	4,392,320	New Mexico	82,560
Arizona	391,040	New York	2,099,200
Arkansas	561,280	North Carolina	4,235,520
California	4,054,400	North Dakota	1,168,000
Colorado	1,504,000	Ohio	1,955,200
Connecticut	331,520	Oregon	285,440
Delaware	200,960	Pennsylvania	1,265,920
Florida	1,093,120	Porto Rico	211,200
Georgia	1,160,320	Rhode Island	694,400
Idaho	726,400	South Carolina	2,561,280
Illinois	3,792,000	South Dakota	310,400
Indiana	1,303,040	Tennessee	1,949,440
Iowa	1,473,920	Texas	4,786,560
Kansas	1,500,800	Utah	960,640
Kentucky	876,800	Vermont	145,280
Louisiana	2,283,520	Virginia	2,776,320
Maryland	1,704,320	Washington	435,200
Massachusetts	509,440	West Virginia	162,560
Michigan	1,969,920	Wisconsin	1,018,240
Minnesota	311,040	Wyoming	197,760
Mississippi	1,857,280	Total	63,621,120
Missouri	2,421,120		
Montana	68,480		
Nebraska	999,040		
New Jersey	833,920		

VALUE OF FARM PROPERTY PER ACRE*

STATE OR TERRITORY	Total acres in farms	Land and improvements except buildings	Buildings	Total value per acre
Alabama	20,685,427	\$4 84	\$1 66	\$6 50
Alaska	159	†	8 05	8 05
Arizona	1,935,327	5 08	1 17	6 25
Arkansas	16,636,719	6 32	1 81	8 13
California	28,828,951	21 86	2 68	24 54
Colorado	9,474,588	9 53	1 68	11 21
Connecticut	2,312,083	22 68	19 45	42 13
Delaware	1,066,228	22 29	10 00	32 29
District of Columbia ..	8,489	1,142 68	184 21	1,326 89
Florida	4,363,891	7 06	2 28	9 34

* According to Census of 1900.

† No titles to land.

VALUE OF FARM PROPERTY PER ACRE—Continued

STATE OR TERRITORY	Total acres in farms	Land and improvements except buildings	Buildings	Total value per acre
Georgia	26,392,057	\$ 5 24	\$ 1 69	\$ 6 93
Hawaii	2,609,613	21 64	1 35	22 99
Idaho	3,204,903	11 07	2 13	13 20
Illinois	32,794,728	46 16	7 66	53 82
Indiana	21,619,623	31 80	7 12	38 92
Indian Territory	7,269,081	5 39	1 55	6 94
Iowa	34,574,337	36 34	6 96	43 30
Kansas	41,662,970	12 77	2 67	15 44
Kentucky	21,979,422	13 24	4 12	17 36
Louisiana	11,059,127	9 74	3 02	12 76
Maine	6,299,946	7 83	7 48	15 31
Maryland	5,170,075	23 28	10 60	33 88
Massachusetts	3,147,064	27 62	22 59	50 21
Michigan	17,561,698	24 11	9 05	33 16
Minnesota	26,248,498	21 30	4 19	25 49
Mississippi	18,240,736	6 29	2 03	8 32
Missouri	33,997,873	20 45	4 36	24 81
Montana	11,844,454	4 44	76	5 20
Nebraska	29,911,779	16 26	3 04	19 30
Nevada	2,561,647	5 17	91	6 08
New Hampshire	3,609,864	9 83	9 59	19 42
New Jersey	2,840,966	32 86	24 36	57 22
New Mexico	5,130,878	3 37	69	4 06
New York	22,648,109	24 34	14 87	39 21
North Carolina	22,749,356	6 21	2 31	8 52
North Dakota	15,542,640	11 15	1 63	12 78
Ohio	24,501,985	33 33	8 95	42 28
Oklahoma	15,719,258	7 01	87	7 88
Oregon	10,071,328	11 23	1 91	13 14
Pennsylvania	19,371,015	29 71	16 66	46 36
Rhode Island	455,602	29 45	21 29	50 74
South Carolina	13,985,014	7 13	1 92	9 05
South Dakota	19,070,616	9 92	1 61	11 53
Tennessee	20,342,058	9 98	3 10	13 08
Texas	125,807,017	4 72	79	5 51
Utah	4,116,951	9 74	2 58	12 32
Vermont	4,724,440	9 69	7 88	17 57
Virginia	19,907,883	10 07	3 56	13 63
Washington	8,499,297	11 68	1 91	13 59
West Virginia	10,654,513	12 60	3 19	15 79
Wisconsin	19,862,727	26 71	7 83	34 54
Wyoming	8,124,536	2 88	43	3 31

THE SIZE OF FARMS IN THE UNITED STATES

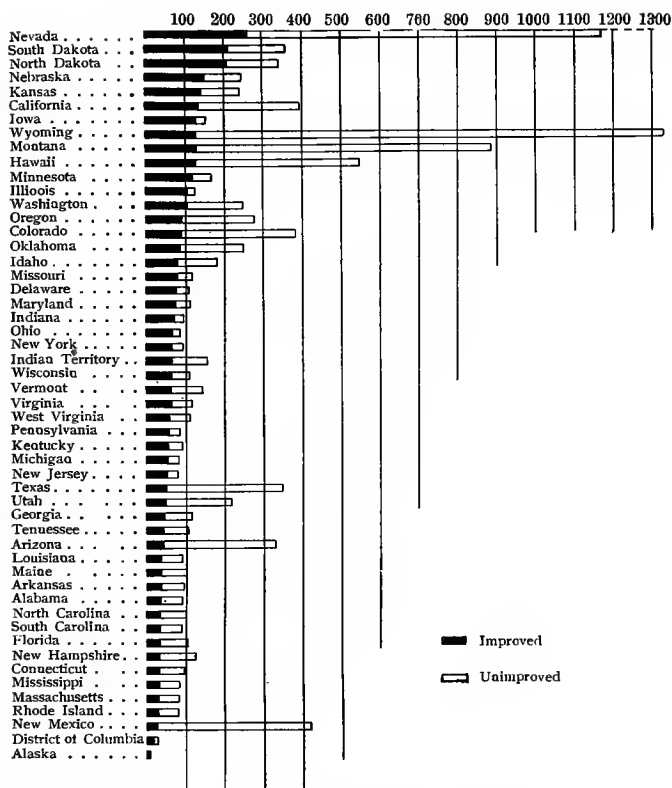


FIG. 133. The average number of acres per farm.

MEAN ELEVATION OF THE UNITED STATES BY STATES
AND TERRITORIES¹

State or Territory	Feet	State or Territory	Feet
Alabama.....	500	Nebraska.....	2,600
Arizona.....	4,100	Nevada.....	5,500
Arkansas.....	650	New Hampshire.....	1,000
California.....	2,900	New Jersey.....	250
Colorado.....	6,800	New Mexico.....	5,700
Connecticut.....	500	New York.....	900
Delaware.....	60	North Carolina.....	700
District of Columbia.....	150	North Dakota.....	1,900
Florida.....	100	Ohio.....	850
Georgia.....	600	Indian Territory.....	1,300
		Oklahoma.....	
Idaho.....	5,000	Oregon.....	3,300
Illinois.....	600	Pennsylvania.....	1,100
Indiana.....	700	Rhode Island.....	200
Iowa.....	1,000	South Carolina.....	350
Kansas.....	2,000	South Dakota.....	2,200
Kentucky.....	750	Tennessee.....	900
Louisiana.....	100	Texas.....	1,700
Maine.....	600	Utah.....	6,100
Maryland.....	350	Vermont.....	1,000
Massachusetts.....	500	Virginia.....	950
Michigan.....	900	Washington.....	1,700
Minnesota.....	1,200	West Virginia.....	1,500
Mississippi.....	300	Wisconsin.....	1,050
Missouri.....	800	Wyoming.....	6,700
Montana.....	3,400	United States.....	2,500

INCREASE OF FARM LANDS IN THE UNITED STATES

Census year	Number of farms	Per cent of increase	Acres of land in farms	Per cent of increase
1900.....	5,739,657	25.7	841,201,546	35.0
1890.....	4,564,641	13.9	623,218,619	16.3
1880.....	4,008,907	50.7	536,081,835	31.5
1870.....	2,659,985	30.1	407,735,041	0.1
1860.....	2,044,077	41.1	407,212,538	38.7
1850.....	1,449,073	....	293,560,614	....

¹ U. S. Geol. Surv., 13th Ann. Rpt., Pt. II, p. 289.

MILEAGE OF RAILROADS IN THE UNITED STATES AND TERRITORIES
TO YEAR ENDED JUNE 30, 1903

STATE OR TERRITORY	Total miles	Proportion to total mileage	Number of miles of line	
			Per 100 sq. miles	Per 10,000 inhabitants
Alabama	4,486.47	2.16	8.70	23.33
Arkansas	3,814.08	1.84	7.19	27.66
California	6,099.50	2.93	3.91	39.06
Colorado	4,885.26	2.35	4.71	86.10
Connecticut	1,025.10	0.49	21.16	10.73
Delaware	335.60	0.16	17.12	17.29
Florida	3,468.76	1.67	6.40	62.41
Georgia	6,228.87	3.00	10.56	26.73
Idaho	1,447.74	0.70	1.72	85.16
Illinois	11,426.87	5.50	20.41	22.54
Indiana	6,830.36	3.28	19.02	25.82
Iowa	9,541.33	4.59	17.20	40.66
Kansas	8,798.72	4.23	10.77	56.92
Kentucky	3,205.30	1.54	8.01	14.20
Louisiana	3,490.40	1.68	7.68	24.03
Maine	2,004.05	0.96	6.70	27.45
Maryland	1,423.38	0.68	14.44	11.40
Massachusetts	2,122.06	1.02	26.39	7.20
Michigan	8,572.27	4.12	14.93	33.68
Minnesota	7,616.32	3.66	9.62	41.37
Mississippi	3,304.92	1.59	7.13	20.27
Missouri	7,337.10	3.53	10.67	22.46
Montana	3,217.79	1.54	2.21	125.79
Nebraska	5,816.75	2.80	7.57	51.89
Nevada	955.37	0.46	0.87	213.73
New Hampshire	1,261.36	0.61	14.01	29.16
New Jersey	2,270.07	1.09	30.17	11.46
New York	8,242.65	3.96	17.31	10.79
North Carolina	4,071.59	1.96	8.38	20.45
North Dakota	3,069.10	1.48	4.37	91.48
Ohio	9,040.04	4.35	22.18	20.68
Oregon	1,720.12	0.83	1.82	39.58
Pennsylvania	10,705.75	5.15	23.80	16.16
Rhode Island	211.89	0.10	20.12	4.70
South Carolina	3,151.19	1.52	10.44	22.36

MILEAGE OF RAILROADS IN THE UNITED STATES AND TERRITORIES
TO YEAR ENDED JUNE 30, 1903 — Continued

STATE OR TERRITORY	Total miles	Proportion to total mileage	Number of miles of line	
			Per 100 sq. miles	Per 10,000 inhabitants
South Dakota	3,013.88	1.45	3.92	71.39
Tennessee.....	3,337.65	1.60	7.99	15.71
Texas	11,344.03	5.45	4.32	35.39
Utah	1,664.49	0.80	2.03	57.24
Vermont	1,058.75	0.51	11.59	29.31
Virginia.....	3,896.51	1.87	9.71	19.99
Washington	3,275.03	1.57	4.90	60.14
West Virginia	2,699.70	1.30	10.95	26.79
Wisconsin.....	6,976.	3.35	12.81	32.07
Wyoming	1,240.66	0.60	1.27	127.64
Alaska .....	.....	.....	.....	.....
Arizona	1,680.50	0.81	1.49	130.07
District of Columbia.....	31.15	0.01	51.92	1.06
Indian Territory	2,190.40	1.05	7.07	53.13
New Mexico	2,399.26	1.15	1.96	116.75
Oklahoma	1,971.13	0.95	5.08	47.09
Grand total.....	207,977.22	100.00	7.00	26.03

ACREAGE OF FARMS OF SPECIFIED TENURES

FARMS CLASSIFIED BY TENURE	Total	Improved	Per cent improved	AVERAGE	
				All land	Impro'd land
Owners	422,354,923	216,055,395	51.2	134.1	68.6
Part owners	124,956,065	56,745,743	45.4	276.7	125.7
Owners and tenants.	9,152,280	5,441,941	59.5	171.7	102.1
Managers	89,665,821	11,178,861	12.5	1,514.3	188.8
Cash tenants.....	77,360,463	42,596,859	55.1	102.7	56.6
Share tenants	117,711,994	82,774,392	70.3	92.4	65.0
Total.....	841,201,546	414,793,191	49.3	146.6	72.3

THE PRODUCTION OF SANITARY MILK. SCORE CARD PROPOSED
BY R. A. PEARSON, PROFESSOR OF DAIRY INDUSTRY,
CORNELL UNIVERSITY

Date..... Dairy of

		Perfect	Score
I. Health of the herd and its protection.	Health and comfort of the cows and their isolation when sick or at calving time	45	
	Location, lighting and ventilation of the stable	35	
	Food and water	20	
	Total	100	
II. Cleanliness of the cows and their surroundings.	Cows	30	
	Stable	20	
	Barnyard and pasture	20	
	Stable air (dust and odors)	30	
	Total	100	
III. Construction and care of the utensils.	Construction of utensils and their cleaning and sterilizing	40	
	Water supply for cleaning; location; protection of source	25	
	Care of utensils after cleaning	20	
	Use of small-top milking pail	15	
	Total	100	
IV. Health of employees and manner of milking.	Health of employees	45	
	Clean over-all milking suits and milking with clean, dry hands	30	
	Quiet milking; cleanliness of the udder; discard fore milk	25	
	Total	100	
V. Handling the milk.	Prompt and efficient cooling	35	
	Handle milk in sanitary room; hold it at low temperature	35	
	Protection during transportation to market	30	
	Total	100	
	Total of all scores	500	

If the total of all scores is And each division is The sanitary conditions are
 480 or above.....90 or above.....Excellent
 450 or above.....80 or above.....Good
 400 or above.....60 or above.....Medium
 Below 400.....Or any division is below 60...Poor

The sanitary conditions are.....

Scored by

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Many publications of the United States Department of Agriculture are directly valuable to the practical farmer, or any interested in domestic and rural affairs, and may be obtained free upon application to the Department or to the United States Congressman from the applicant's district.

This is an epoch of extensive political changes and unparalleled economic activities. It is, therefore, judicious, where one contemplates investment in an unknown region, to secure the latest available information

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